205c / AIRPERM/COLO/F1/XCEL ENERGY

Region 8

42823

Environmental Protection Agency

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205c AIRPERM, CO, PUBLIC SERVICE (PSC,
LEYDEN NG STORAGE, NSR, F1 08-059-0 PRIV
Fldr #: 42823

0 0

Fldr #: 42823

Tom Aalto/P2/R8/USEPA/US
10/12/2005 12:02 PM

To Nancy Morlock/P2/R8/USEPA/US@EPA
cc Randy Breeden/P2/R8/USEPA/US@EPA, Suzanne Stevenson/P2/R8/USEPA/US@EPA, Joshua Rickard/ENF/R8/USEPA/US@EPA, Hans Buenning/P2/R8/USEPA/US@EPA
bcc
Subject Leyden facility- Review of Xcel's CAA Response- DRAFT

Nancy,

As we discussed, I have reviewed the Xcel response dated September 19, 2005 to the EPA CAA information request dated August 17, 2005. (b)(5) (DPP)

Please let me know if you have any questions.

Thanks,

Tom

Randy Breeden/P2/R8/USEPA/US
10/04/2005 08:31 AM

To Joshua Rickard/ENF/R8/USEPA/US@EPA
cc Hans Buenning/P2/R8/USEPA/US@EPA, Nancy Morlock/P2/R8/USEPA/US@EPA, Tom Aalto/P2/R8/USEPA/US@EPA
bcc
Subject Re: Leyden: Xcel response

(b) (5) (DPP)

[redacted]

Joshua Rickard/ENF/R8/USEPA/US

Joshua Rickard/ENF/R8/USEPA/US
10/04/2005 08:24 AM

To Tom Aalto/P2/R8/USEPA/US@EPA
cc Hans Buenning/P2/R8/USEPA/US@EPA, Nancy Morlock/P2/R8/USEPA/US@EPA, Randy Breeden/P2/R8/USEPA/US@EPA
Subject Re: Leyden: Xcel response

(b) (5) (DPP)

[redacted]

Joshua Rickard
MACT Enforcement Team
303-312-6460
Tom Aalto/P2/R8/USEPA/US

Tom Aalto/P2/R8/USEPA/US
10/04/2005 07:56 AM

To Joshua Rickard/ENF/R8/USEPA/US@EPA
cc Randy Breeden/P2/R8/USEPA/US@EPA, Nancy Morlock/P2/R8/USEPA/US@EPA, Hans Buenning/P2/R8/USEPA/US@EPA
Subject Leyden: Xcel response

Josh,

(b) (5)

[redacted]

Thanks,

Tom

Xcel Energy℠

James D. Albright
Assistant General Counsel

1225 17th Street, Suite 900
Denver, Colorado 80202-5533
Phone: 303.294.2753
Fax: 303.294.2988

September 19, 2005

VIA FEDERAL EXPRESS

U.S. Environmental Protection Agency, Region 8
999 18th Street, Suite 300
Denver, CO 80202-2466
Attention: Joshua Rickard (8ENF-AT)

Re: Response to Clean Air Act Request for Information – Xcel Energy Leyden Natural Gas Storage Facility

Dear Mr. Rickard:

Enclosed is the response of Public Service Company of Colorado ("PSCo") to the August 17, 2005 Request for Information (the "Request") from the United States Environmental Protection Agency ("EPA") concerning the Leyden Natural Gas Storage Facility ("Facility") in Jefferson County, Colorado.

As an initial matter, it is important to point out that the questions raised in the Request were explored in-depth before the Colorado Oil and Gas Conservation Commission ("COGCC") during two full days of hearings regarding the closure of the Facility, in which the COGCC considered the expert reports and sworn testimonies of five scientific experts. The Colorado General Assembly has vested the COGCC with the "exclusive authority to regulate the public health, safety, and welfare aspects, including protection of the environment, of the termination of operations and permanent closure" of underground natural gas storage caverns. *See* § 34-60-106(17)(a), C.R.S. In September 2003, the COGCC unanimously approved PSCo's plan for closure of the Facility, expressly finding that the plan protects public health and the environment.

In addition, EPA has approved Colorado's air program, pursuant to which the Colorado Department of Public Health and Environment ("CDPHE") has primary jurisdiction to implement and enforce the Clean Air Act ("CAA") in the State. The CDPHE has determined that venting of natural gas at the Facility does not exceed regulatory levels. Indeed, the constituents in the natural gas are well below emission standards for volatile organic compounds and hazardous air pollutants. Moreover, the natural gas stored at the Leyden Facility is not an extremely hazardous substance subject to regulation under Section 112(r) of the CAA.

The COGCC and the CDPHE have acted to ensure that the closure of the Facility is protective of human health and the environment and complies with the CAA. Given the extensive involvement of these State agencies, there simply is no basis for EPA's Request.

Nonetheless, PSCo has acted in good faith to provide a detailed response to the Request. This response is based upon a review of PSCo's records, and includes all non-privileged information in PSCo's custody and control that relate to EPA's Request. This response is based upon information and belief, and, except where otherwise noted, is complete given the information known to date. To the extent PSCo discovers any new information, it specifically reserves the right to supplement or amend these answers. This response does not constitute an admission by PSCo of liability with respect to the Facility, the conditions on or surrounding the Facility, or any acts or omissions by any person concerning the Facility.

If you have any questions regarding the enclosed response, please contact me or Bill Uding at 303-571-7383.

Very truly yours,

James D. Albright
Assistant General Counsel

Attachments
Enclosures

cc (without enclosures):

Ken Fellman, Mayor
City of Arvada
P.O. Box 8101
8101 Ralston Road
Arvada, CO 80001-8101

Craig Kocian, City Manager
City of Arvada
P.O. Box 8101
8101 Ralston Road
Arvada, CO 80001-8101

cc (without enclosures) (continued):

Brian J. Macke, Director
Colorado Oil and Gas Conservation Commission
1120 Lincoln Ave., Suite 801
Denver, CO 80203

Margie Perkins
Colorado Department of Public Health and Environment
Air Quality Division
4300 Cherry Creek Dr-S
Denver, CO 80246

RESPONSES OF PUBLIC SERVICE COMPANY OF COLORADO TO USEPA'S CLEAN AIR ACT REQUEST FOR INFORMATION DATED AUGUST 17, 2005 REGARDING THE LEYDEN NATURAL GAS STORAGE FACILITY IN JEFFERSON COUNTY, COLORADO

1. Describe the amount of gas that has been lost, stored and unaccounted for from the Leyden caverns. For each of these categories, provide supporting calculations, documentation or justification indicating how the amounts were determined.

Response: As a point of clarification, the storage of gas at the Leyden Gas Storage Facility occurred in the Lower Laramie formation, which includes the former coal mine caverns, as well as sandstones and other permeable rock within this formation. Prior to the Company's use of the former coal mine for gas storage, the roofs of the mine caverns collapsed, creating "rubble zones" within the Lower Laramie formation in which gas could be safely and efficiently stored.

The volume of gas "lost" at Leyden is 574,012 Mcf. (Please note that one Mcf equals one thousand standard cubic feet at 14.73 p.s.i.a.) This represents the volume of gas currently remaining in the Leyden Gas Storage Facility that will not be recovered. This amount is supported by the monthly Summary of Gas Delivered Statements; copies of the available Summary of Gas Delivered Statements are enclosed herewith. This volume of unrecovered gas remaining in the Leyden Facility is also consistent with the June 16, 2003 Report of Dave O. Cox of Questa Engineering Corporation, and Mr. Cox's testimony in support thereof during the hearings held on Public Service's Closure Plan before the Colorado Oil and Gas Conservation Commission ("COGCC") on August 18 and 19, 2003. A copy of Mr. Cox's report, along with a complete transcript of the COGCC hearings is enclosed.

The total volume of gas "stored" in the Leyden Facility was 90,009,966 Mcf, or approximately 90 billion cubic feet (Bcf). This represents the cumulative total volume of gas injected into and stored in the Facility during its 45-year operating history. This volume is supported by the enclosed monthly activity reports referenced above.

The volume of gas "unaccounted for" during the operation of the Leyden Facility is reported as 2,869,178 Mcf. This represents the total volume recorded by the Company to reflect gas used in operations at the Leyden Facility and otherwise to make total system volumes (i.e., all inlet and outlet points) balance to zero. This volume is supported, in part, by annual calculations ("Lost and Unaccounted for Gas Calculations") that were performed to reflect a combination of metering inaccuracies, fuel used for compression, field use, fuels for heating equipment, pipe cleaning or pigging operations, and various incidental losses from surface equipment. Copies of the available annual Lost and Unaccounted for Gas Calculations are enclosed

herewith. The significance and derivation of this volume was discussed by Mr. Uding in his testimony during the COGCC hearings. See enclosed transcripts.

2. Provide a list of all points where emissions have been vented and left the cavern, such as wells, mine shafts and gas migration, and how much gas has been released to the atmosphere through these points. Include information on sources that in the past may have emitted gas and procedures that were taken to prevent any further gas release or any other reasons that gas may no longer be expected to vent from these areas. Include any gas analysis available for these locations.

Response: Please see note in response to Request No. 1 regarding the location of the underground storage of gas. Every known incident of storage gas released to the atmosphere from the Leyden Gas Storage Facility was from a man-made penetrations to the storage formation. These releases can be categorized as unintentional or planned, and will be discussed in order below. The sources of these releases were also discussed in the June 16, 2003 Report of Dave O. Cox of Questa Engineering Corporation, and in Mr. Cox's testimony during the hearings held on Public Service's Closure Plan before the COGCC on August 18 and 19, 2003. Copies of both Mr. Cox's expert report and the complete transcript of the hearings are enclosed.

A. Unintentional Releases

In 1964, a leak to the surface was discovered in Barbara Gulch as gas bubbles under ice. This leak was found to be an abandoned, but unplugged, deep water well. A drill rig was used to clean the well bore to bottom and set new cemented casing. This well became Observation Well #17b that was used for the rest of the life of the Facility. No further gas was observed or released from this location. This well was plugged and abandoned as a part of the closure in 2005.

In 1979, a leak to the surface was discovered in Section 26 during a walking leak survey that was a part of normal operations. This leak was found to be a coal exploration core hole drilled ahead of mining. A drill rig was used to clean this hole to bottom and new cemented casing was installed. This well became Observation Well #23 and was used for the rest of the life of the facility. No further gas was released from this location. This well was plugged and abandoned as a part of the closure in 2005.

During the operation of the storage field, gas was detected at the surface of the #2 shaft seal. This occurred in the late 1970s. The pumping of water from the cavern area around the #2 shaft seal was halted, allowing this cavern area to flood and cut off gas to the shaft seal. No further gas was detected at this location. This well was plugged and abandoned as a part of the closure in 2005.

B. Planned Releases

Well #31. This observation well was drilled in 1993 outside of the mined cavern area. A small accumulation of storage gas was encountered in a Lower Laramie sandstone above the stratum containing the coals. The Staff of the COGCC suggested that, after several years of pressure observation, the gas be vented. The well was vented to atmosphere and the volumes and rates were measured. Venting began in October 1999 and continued until October 2004, when the gas was depleted. The total volume vented during this period was 92 Mcf.

Well #36. This observation well was drilled in 1999. Storage gas was found in a Lower Laramie sandstone and was observed to be in direct communication with the caverns. During the gas recovery operations of the Facility closure, the pressure observed in Well #36 declined with the field pressure until water in the caverns apparently cut off the connection. This well was then vented to deplete the remaining gas in this sandstone. The volume vented from April 2004 to July 2005, when production ceased, was 228 Mcf.

Well #7. This water well was drilled in 1960 as a water production well to dewater the east mine cavern. Water production was halted permanently in the late 1970s to remedy the surface gas occurrence in the #2 shaft seal. The well was worked over as a part of the closure process to be used as an observation well and, later, as a water injection well. Following this work over, small volumes of storage gas were found in the well. The well was connected to gathering lines and produced. When the pressures became too low to flow into the gathering lines, the gas was vented to atmosphere. The vent was started in July 2004 and ceased in August 2004, when the gas depleted. The total volume vented was 13 Mcf.

Well #5. This well was operated as a gas injection and withdrawal well during the operational life of the Leyden Facility. Being the stratigraphic high well in the storage system, gas was produced from this well during the cavern-flooding phase of the closure operations. As the water encroached on the well, the flow rate and gas pressure fell below what could reasonably be gathered in the piping systems for recovery back to the Leyden station. The well was then put on vent to atmosphere. The venting began in October 2004 and ended in May 2005. The total gas volume vented during this period was 84 Mcf.

Consolidated Mutual Water Co., Permit No. 60395-F. This well was drilled by the Consolidated Mutual Water Company in the Spring of 2004 in Section 23 off the northeast edge of the Leyden Facility property. Storage gas was discovered during a water production test following completion. The wellhead equipment was rebuilt to accommodate the presence of gas and a short production test was started. Gas was available at high rates when the water was pumped. The well was shut in and is

awaiting flaring equipment prior to continuing testing or production. The volume vented during the October 2004 test was 1683 Mcf.

3. Provide information on Xcel's activities to inform the public regarding the one-mile buffer area around Leyden designated the "Protection Zone." This includes information to inform home owners, drillers and other persons that may be affected by this zone.

Response: Pursuant to the COGCC's approved modifications to the Company's Closure Plan, the following procedures have been put into place. COGCC Staff has formally requested that the Colorado Office of the State Engineer notify the COGCC Staff of any applications for water well permits for wells proposed to be drilled within a one mile radius of the Leyden Facility property. From August 2003 through June 2004, a one-half mile radius criterion was employed. Upon receipt of a notice, the COGCC Staff notifies the Company and issues a letter to the well operator recommending the use of blowout prevention equipment while drilling a water well. Company personnel also contact the well operator and advise of the possibility of encountering natural gas in the drilling operations and offer to reimburse the drilling operator for any costs associated with the use of blowout prevention equipment or other costs incurred in anticipation of encountering natural gas.

Since this procedure was put into place in August 2003, only one well permit was applied for that triggered the notification procedures outlined above. This permit was for the Consolidated Mutual Water Well, Permit No. 60395-F, located approximately 1700 feet from the Leyden Facility property. Company personnel reviewed recommended safety procedures with a representative of the engineering company supervising the well drilling operations. It was after the discovery of gas in April 2004 at this location that the COGCC Staff and the Company agreed to expand the radius for this notification zone from one-half mile to one mile.

4. Are there any programs to monitor for natural gas around the area? This includes programs that may be in place to monitor for natural gas in homes. Provide information on these programs. Has any of this monitoring been done in locations near the inferred subsurface fracture defined in the seismic line GR-5?

Response: An extensive soil gas monitoring program is in place in the area on and around the Leyden Facility. The program was started in February 2000 and continues today, collecting soil gas samples from a network of approximately 80 shallow monitoring wells on a quarterly basis. The samples are analyzed for hydrocarbons and a report is generated and submitted to the COGCC. Additionally, an electronic database was developed to track and view the data. A copy of that database is provided on the enclosed CD-ROM. A copy of the original report from this program is also enclosed. This report details the soil gas monitoring well network and analysis

method. The program was expanded following the COGCC hearings on the Leyden Closure Plan. The database also includes data collected from an adjacent monitoring effort conducted by the contractor for the Spring Mesa Subdivision housing development. The Spring Mesa Subdivision property is wholly located in Section 35, south of the Leyden Facility. The data points from this program are identified with a SM prefix in the database.

There are no Company-sponsored programs in place that monitor for natural gas inside of homes in this area.

The existing soil gas-monitoring network includes 4 monitoring wells along the trace of the GR-5 seismic line. These wells are identified as SVW-39, SVW-40, SVW-41 and SVW-42. These sites were put into service in February 2004 and are expected to be active for the remainder of the program.

5. Provide information about any current and future plans and programs to monitor shallow soil gas in and around the Leyden facility. Also, describe the results and conclusions of any past monitoring programs and supporting data.

Response: See response to Request No. 4.

6. Provide information about any current and future plans and programs to monitor subsurface soil gas in and around the Leyden facility. Also, describe the results and conclusions of any past monitoring programs and supporting data.

Response: See response to Request No. 4.

7. Who is the current owner and/or operator of the injection wells at the Leyden facility?

Response: Public Service Company of Colorado currently owns and operates the eight remaining wells at the Leyden Facility, as follows: Injection Well #8; Water Withdrawal Wells: Well #7, Well #12, Well #21; Observation Wells: Well #33, Well #34, Well #35 and Well #36).

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET- SUITE 300
DENVER, CO 80202-2466
Phone 800-227-8917
http://www.epa.gov/region08

AUG 17 2005

Ref: ENF-AT

Registered Agent:
Corporation Service Company
1560 Broadway
Denver, CO 80202

Re: Clean Air Act Request for Information Regarding Xcel Energy, Inc. Leyden Natural Gas Storage Facility in Jefferson County, Colorado

To Whom It May Concern:

The United States Environmental Protection Agency (EPA) hereby requires Public Service Company (Xcel) to provide certain information to assist in determining the Clean Air Act ("the Act") compliance status of the Leyden Natural Gas Storage Facility located in or near Arvada, Colorado.

Pursuant to Section 114(a) of the Act, 42 U.S.C. § 7414(a), the Administrator of EPA is authorized to require any person who the Administrator believes may have needed information to establish and maintain records, make reports and provide such other information as he may reasonably require pursuant to any provision of the Act. Therefore, you are hereby required to respond to the following questions and requests for information within the time period specified:

1. Describe the amount of gas that has been lost, stored and unaccounted for from the Leyden caverns. For each of these categories, provide supporting calculations, documentation or justification indicating how the amounts were determined.

2. Provide a list of all points where emissions have been vented and left the cavern, such as wells, mine shafts and gas migration, and how much gas has been released to the atmosphere through these points. Include information on sources that in the past may have emitted gas and procedures that were taken to prevent any further gas release or any other reasons that gas may no longer be expected to vent from these areas. Include any gas analysis available for these locations.

3. Provide information on Xcel's activities to inform the public regarding the one-mile buffer area around Leyden designated the "Protection Zone." This includes

information to inform home owners, drillers and any other person that may be affected by this zone.

4. Are there any programs to monitor for natural gas around the area? This includes programs that may be in place to monitor for natural gas in homes. Provide information on these programs. Has any of this monitoring been done in locations near the inferred subsurface fracture defined in the seismic line GR-5?

5. Provide information about any current and future plans and programs to monitor shallow soil gas in and around the Leyden facility. Also, describe the results and conclusions of any past monitoring programs and supporting data.

6. Provide information about any current and future plans and programs to monitor subsurface soil gas in and around the Leyden facility. Also, describe the results and conclusions of any past monitoring programs and supporting data.

7. Who is the current owner and/or operator of the injection wells at the Leyden facility?

You must submit the response to the above items within thirty (30) calendar days after your receipt of this letter. This information should be submitted to:

U.S. Environmental Protection Agency, Region 8
999 18th Street, Suite 300
Denver, CO 80202-2466
Attention: Joshua Rickard (8ENF-AT)

If you anticipate being unable to respond fully to this request within the time period specified, you must submit a sworn declaration by a responsible corporate official within 20 calendar days after your receipt of this letter, specifying what information will be provided within the time specified, describing what efforts have been/are being made to obtain other responsive information and providing a detailed schedule of when such other responsive information can be provided. Upon receipt and based upon such declaration, EPA may extend the time in which responsive information must be provided.

Your response to this requested information must be certified by a duly authorized officer or agent of Xcel by signing the enclosed Statement of Certification (see Enclosure 1) and returning it with your response. All information submitted in response to this request must be certified as true, correct, accurate, and complete by an individual with sufficient knowledge and authority to make such representations on behalf of Xcel.

A knowing submittal of false information in response to this request may be actionable under Section 113(c)(2) of the CAA, as well as 18 U.S.C. §§ 1001 and 1341. Xcel should also be aware that a failure to comply fully with the terms of this request may subject it to an enforcement action under Section 113 of the CAA, 42 U.S.C. § 7413.

This letter in no way affects the obligations of Xcel to comply with other Federal laws and regulations. In addition, nothing in this letter shall be construed to be a waiver by EPA of any rights or remedies under the Clean Air Act.

Xcel may assert a claim of business confidentiality regarding any portion of the information submitted in response to this request (except for emission data). (See 40 CFR 2.201 *et seq.*) Failure to assert such a claim will render all submitted information available to the public without further notice. If you believe the disclosure of specific information would reveal a trade secret, clearly identify such information.

If you have any questions, the most knowledgeable people to contact are Joshua Rickard at 303-312-6460 for technical concerns, or David Rochlin at 303-312-6892 for legal concerns on this matter.

Sincerely,

Carol Rushin
Assistant Regional Administrator,
Office of Enforcement, Compliance, &
Environmental Justice

Enclosure: Statement of Certification

cc: Wayne H. Brunetti
Chief Executive Officer
Xcel Energy, Inc.
800 Nicollet Mall
Minneapolis, MN 55402

Ken Fellman, Mayor
City of Arvada
P.O. Box 8101
8101 Ralston Road
Arvada, CO 80001-8101

Craig Kocian, City Manager
City of Arvada
P.O. Box 8101
8101 Ralston Road
Arvada, CO 80001-8101

Brian J. Macke, COGCC
1120 Lincoln
Denver, CO 80203

Margie Perkins, CDPHE
Air Quality Division
4300 Cherry Creek Dr S
Denver, CO 80246

STATEMENT OF CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

_____
(Signature)

_____
(Title)

_____
(Date)

Joshua
Rickard/ENF/R8/USEPA/US
08/04/2005 04:19 PM

To David Rochlin/ENF/R8/USEPA/US

cc Carol Campbell/P2/R8/USEPA/US@EPA, Carol Rushin/ENF/R8/USEPA/US@EPA, Cynthia Reynolds/ENF/R8/USEPA/US@EPA, Eddie Sierra/ENF/R8/USEPA/US@EPA, Hans Buenning/P2/R8/USEPA/US@EPA, Jim Eppers/ENF/R8/USEPA/US@EPA, Martin Hestmark/ENF/R8/USEPA/US, Michael Risner/ENF/R8/USEPA/US@EPA, Peter Ornstein/RC/R8/USEPA/US@EPA, Sara Laumann/RC/R8/USEPA/US@EPA, Suzanne Stevenson/P2/R8/USEPA/US@EPA, Valois Shea/P2/R8/USEPA/US@EPA

bcc

Subject Re: Newest version of letter to Xcel re Leyden

I added one line to question 2 that I forgot to add to the version David had.

Leyden 114.Aug4draft.doc

Joshua Rickard
MACT Enforcement Team
303-312-6460

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET- SUITE 300
DENVER, CO 80202-2466
Phone 800-227-8917
http://www.epa.gov/region08

Ref: ENF-AT **THIS DOCUMENT IS PREDECISIONAL & NOT INTENDED FOR DISTRIBUTION BEYOND ORIGINAL RECIPIENT**

Registered Agent:
Corporation Service Company
1560 Broadway
Denver, CO 80202

Re: Clean Air Act Request for Information Regarding Xcel Energy, Inc. Leyden Natural Gas Storage Facility in Jefferson County, Colorado

To Whom It May Concern:

The United States Environmental Protection Agency (EPA) hereby requires Public Service Company (Xcel) to provide certain information in order to determine the Clean Air Act ("the Act") compliance status of the Leyden Natural Gas Storage Facility located in Arvada, Colorado.

Pursuant to Section 114(a) of the Act, 42 U.S.C. § 7414(a), the Administrator of EPA is authorized to require any person who owns and/or operates an emission source to establish and maintain records, make reports and provide such other information as he may reasonably require pursuant to any provision of the Act. Therefore, you are hereby required to respond to the following questions and requests for information within the time period specified:

1. Describe the amount of gas that has been lost, stored and unaccounted for from the Leyden caverns. For each of these categories, provide supporting calculations, documentation or justification that shows how the numbers were determined.

2. Provide a list of all points where emissions have been vented and left the cavern, such as wells, mine shafts and gas migration, and how much gas has been released to the atmosphere through these points. Include information on sources that in the past may, have emitted gas and procedures that were taken to prevent any further gas release or any other reasons that gas may no longer be expected to vent from these areas. Include any gas analysis available for these locations.

3. Provide information on Xcel's activities to inform the public regarding the one-mile buffer area around Leyden designated the "Protection Zone." This includes information to inform home owners, drillers and any other person that may be affected by this zone.

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7. Who is the current owner and/or operator of the injection wells at the Leyden facility?

You must submit the response to the above items within thirty (30) calendar days after your receipt of this letter. This information should be submitted to:

U.S. Environmental Protection Agency, Region 8
999 18th Street, Suite 300
Denver, CO 80202-2466
Attention: Joshua Rickard (8ENF-AT)

If you anticipate being unable to respond fully to this request within the time period specified, you must submit a sworn declaration by a responsible corporate official within 20 calendar days after your receipt of this letter, specifying what information will be provided within the time specified, describing what efforts have been/are being made to obtain other responsive information and providing a detailed schedule of when such other responsive information can be provided. Upon receipt and based upon such declaration, EPA may extend the time in which responsive information must be provided.

Your response to this requested information must be certified by a duly authorized officer or agent of Xcel by signing the enclosed Statement of Certification (see Enclosure 1) and returning it with your response. All information submitted in response to this request must be certified as true, correct, accurate, and complete by an individual with sufficient knowledge and authority to make such representations on behalf of Xcel.

A knowing submittal of false information in response to this request may be actionable under Section 113(c)(2) of the CAA, as well as 18 U.S.C. §§ 1001 and 1341. Xcel should also

be aware that a failure to comply fully with the terms of this request may subject it to an enforcement action under Section 113 of the CAA, 42 U.S.C. § 7413.

This letter in no way affects the obligations of Xcel to comply with other Federal laws and regulations. In addition, nothing in this letter shall be construed to be a waiver by EPA of any rights or remedies under the Clean Air Act.

Xcel may assert a claim of business confidentiality regarding any portion of the information submitted in response to this request (except for emission data). (See 40 CFR 2.201 *et seq.*) Failure to assert such a claim will render all submitted information available to the public without further notice. If you believe the disclosure of specific information would reveal a trade secret, clearly identify such information.

If you have any questions, the most knowledgeable people to contact are Joshua Rickard at 303-312-6460 for technical concerns, or David Rochlin at 303-312-6892 for legal concerns on this matter.

Sincerely,

Carol Rushin
Assistant Regional Administrator,
Office of Enforcement, Compliance, &
Environmental Justice

Enclosure: Statement of Certification

cc: Wayne H. Brunetti
Chief Executive Officer
Xcel Energy, Inc.
800 Nicollet Mall
Minneapolis, MN 55402

Ken Fellman, Mayor
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Brian J. Macke, COGCC
1120 Lincoln
Denver, CO 80203

Margie Perkins, CDPHE
Air Quality Division
4300 Cherry Creek Dr S
Denver, CO 80246

Suzanne Stevenson/P2/R8/USEPA/US

08/04/2005 03:13 PM

To: Carol Campbell/P2/R8/USEPA/US@EPA, Carol Hutchings/ENF/R8/USEPA/US@EPA, David Rochlin/ENF/R8/USEPA/US@EPA, Eddie Sierra/ENF/R8/USEPA/US@EPA, Elisabeth Evans/ENF/R8/USEPA/US@EPA, Hans Buenning/P2/R8/USEPA/US@EPA, Jim Eppers/ENF/R8/USEPA/US@EPA, Joshua Rickard/ENF/R8/USEPA/US@EPA, Peter Ornstein/RC/R8/USEPA/US@EPA, Randy Breeden/P2/R8/USEPA/US@EPA, Sara Laumann/RC/R8/USEPA/US@EPA, Steven Moores/RC/R8/USEPA/US@EPA, Tom Aalto/P2/R8/USEPA/US@EPA, Tracy Eagle/P2/R8/USEPA/US@EPA, Valois Shea/P2/R8/USEPA/US@EPA

cc:

bcc:

Subject: Summary of Leyden update mtg 8/4/05

Summary of Leyden update mtg 8/4/05

Robbie Roberts wants R8 to coordinate with CDPHE prior to letters going out

Doug Benevento asked for a copy of the letters for review. Carol Campbell is sending an electronic draft copy today.

There are 2 info requests: 1 letter using only air authorities but asking one question about ownership of the injection wells will be set to Excel.

1 letter using only UIC authorities and asking only UIC questions will be sent to the city of Arvada.

Both of these letters will be sent to Doug Benevento today.

Both letters will be signed at the ARA level.

Letters will be sent out the week of Aug 8.

If there are issues or concerns remaining there will be time next week to address them. ss

Tom Aalto/P2/R8/USEPA/US
06/29/2005 02:28 PM

To: Suzanne Stevenson/P2/R8/USEPA/US@EPA
cc: David Hogle/RA/R8/USEPA/US@EPA, David Rochlin/ENF/R8/USEPA/US@EPA, Erin Perkins/RC/R8/USEPA/US@EPA, Hans Buenning/P2/R8/USEPA/US@EPA, Randy Breeden/P2/R8/USEPA/US@EPA, Sara Laumann/RC/R8/USEPA/US@EPA, Valois Shea/P2/R8/USEPA/US@EPA
bcc:
Subject: Re: DRAFT LEYDEN QUESTIONS

Suzanne,

Here are a few more draft questions to consider adding:

(b) (5) (DPP) [redacted]

Thanks,

Tom

Suzanne Stevenson/P2/R8/USEPA/US

Suzanne Stevenson/P2/R8/USEPA/US
06/27/2005 02:44 PM

To: David Hogle/RA/R8/USEPA/US@EPA, David Rochlin/ENF/R8/USEPA/US@EPA, Erin Perkins/RC/R8/USEPA/US@EPA, Hans Buenning/P2/R8/USEPA/US@EPA, Randy Breeden/P2/R8/USEPA/US@EPA, Sara Laumann/RC/R8/USEPA/US@EPA, Tom Aalto/P2/R8/USEPA/US@EPA, Valois Shea/P2/R8/USEPA/US@EPA
cc:
Subject: DRAFT LEYDEN QUESTIONS

Hello All

(b) (5) (DPP) [redacted]

Questions for the Excel and City of Arvada information request.doc

Suzanne Stevenson/P2/R8/USEPA/US 07/27/2005 04:03 PM	
To	Carol Campbell/P2/R8/USEPA/US@EPA, David Hogle/RA/R8/USEPA/US@EPA, Nancy Morlock/P2/R8/USEPA/US@EPA, Tracy Eagle/P2/R8/USEPA/US@EPA, David Rochlin/ENF/R8/USEPA/US@EPA, Sara Laumann/RC/R8/USEPA/US@EPA, Joshua Rickard/ENF/R8/USEPA/US@EPA, Valois Shea/P2/R8/USEPA/US@EPA, Tom Aalto/P2/R8/USEPA/US@EPA, Randy Breeden/P2/R8/USEPA/US@EPA, Carol Hutchings/ENF/R8/USEPA/US@EPA, Peter Ornstein/RC/R8/USEPA/US@EPA, Carol Campbell/P2/R8/USEPA/US@EPA, Hans Buenning/P2/R8/USEPA/US@EPA
cc	
bcc	
Subject	Follow-up to Leyden Coordination meeting

Hello All

Here is some follow-up to todays coordination meeting.

UIC/Air information requests to Excel and City of Arvada will go out August 3, 2005

Suzanne will write a communication strategy with Questions and Answers, and a Hot Topic Report prior to the requests going out. A note about expecting calls around August 5-8 will be included.

The Excel request will be sent to the registered agent. Carol H will look up the name and address.

Carol Campbell and Suzanne Stevenson will be the contacts for any calls.

We will look into putting the letter on the Webpage if more than 3 requests for a copy are made.

The request for the City of Arvada will go to the Mayor. Both COGCC, CDPHE will be cc'd.

Suzanne will call Kemp Will and Chris Eatherton the day after the letter goes out.

Valois and Carol H will call Chet Pauls at CDPHE to discuss the UIC request

Suzanne will set up a coordination meeting 2 weeks after the 30 day deadline to submit the information.

Dear (Potential addressee: Bill Uding, Project Director, Xcel Energy, or his management):

The United States Environmental Protection Agency (EPA) hereby requires Public Service Company (Xcel) to provide certain information in order to determine the Clean Air Act ("the Act") compliance status of the Leyden Natural Gas Storage Facility located near Arvada, Colorado.

Pursuant to Section 114(a) of the Act, 42 U.S.C. § 7414(a), the Administrator of EPA is authorized to require any person who owns and/or operates an emission source to establish and maintain records, make reports and provide such other information as they may reasonably require pursuant to any provision of the Act. Therefore, you are hereby required to respond to the following questions and requests for information within the time period specified:

1. Describe the amount and composition of gas that has been stored, recovered and sold, and lost or unaccounted for from the Leyden caverns. This includes gas that is currently in the cavern and gas expected to remain in the cavern after final facility closure. For each of these categories provide supporting calculations, documentation or justification that shows how the numbers were determined, including facility Annual FERC Reports.

2. Provide a list of all points where emissions have been vented or left the cavern, such as wells, mine shafts or gas migration, and an estimate of how much gas has been released to the atmosphere through these points. Include information on sources that in the past may or have emitted gas and procedures that were taken to prevent any further gas release or any other reasons that gas may no longer be expected to vent from these areas. This includes information pertaining to the off-site CMWC water well that reportedly experienced 2 flashes from migrating natural gas in April 2004.

3. Provide information on Xcel's activities to provide the public with information regarding the one mile buffer area around Leyden designated the "Protection Zone." This includes information to inform home owners, drillers, construction workers, land excavators, land owners, or any other person that may be affected by this zone.

4. Are there any programs to monitor for methane around the facility and in current or planned residential areas? This includes programs that may be in place to monitor for methane in homes. Provide information on any such programs. Has any of this monitoring been done in residential locations near the inferred subsurface fracture defined in the seismic line GR-5?

5. Provide information about any current and future plans and programs to monitor shallow soil gas in and around the Leyden facility. Also, describe the results and conclusions of any past monitoring programs and supporting data.

6. Provide information about any current and future plans and programs to monitor subsurface permeable layers for gas in and around the Leyden facility. Also, describe the results and conclusions of any past monitoring programs and supporting data.

You must submit the response to the above items within thirty (30) calendar days after your receipt of this letter. This information should be submitted to :

U.S. Environmental Protection Agency, Region VIII
999 18th Street, Suite 300
Denver, CO 80202-2466
Attention: Joshua Rickard (8ENF-AT)

If you anticipate being unable to respond fully to this request within the time period specified, you must submit a sworn declaration by a responsible corporate official within 20 calendar days after your receipt of this letter, specifying what information will be provided within the time specified, describing what efforts have been/are being made to obtain other responsive information and providing a detailed schedule of when such other responsive information can be provided. Upon receipt and based upon such declaration, EPA may extend the time in which responsive information must be provided.

Your response to this requested information must be certified by a duly authorized officer or agent of Xcel. by signing the enclosed Statement of Certification (see Enclosure 1) and returning it with your response. All information submitted in response to this request must be certified as true, correct, accurate, and complete by an individual with sufficient knowledge and authority to make such representations on behalf of Xcel.

A knowing submittal of false information in response to this request may be actionable under Section 113(c)(2) of the CAA, as well as 18 U.S.C. §§ 1001 and 1341. Xcel should also be aware that a failure to comply fully with the terms of this request may subject it to an enforcement action under Section 113 of the CAA, 42 U.S.C. § 7413.

This letter in no way affects the obligations of Xcel to comply with other Federal laws and regulations. In addition, nothing in this letter shall be construed to be a waiver by EPA of any rights or remedies under the Clean Air Act.

Xcel may assert a claim of business confidentiality regarding any portion of the information submitted in response to this request (except for emission data). (See 40 CFR 2.201 *et seq.*) Failure to assert such a claim will render all submitted information available to the public without further notice. If you believe the disclosure of specific information would reveal a trade secret, clearly identify such information.

If you have any questions, please contact Joshua Rickard of my staff at 303-312-6460 for technical concerns, or David Rochlin at 303-312-6892 for legal concerns on this matter.

Sincerely,

Dear:

The United States Environmental Protection Agency (EPA) hereby requires Public Service Company (Xcel) to provide certain information in order to determine the Clean Air Act ("the Act") compliance status of the Leyden Natural Gas Storage Facility located in Arvada, Colorado.

Pursuant to Section 114(a) of the Act, 42 U.S.C. § 7414(a), the Administrator of EPA is authorized to require any person who owns and/or operates an emission source to establish and maintain records, make reports and provide such other information as they may reasonably require pursuant to any provision of the Act. Therefore, you are hereby required to respond to the following questions and requests for information within the time period specified:

1. Describe the amount of gas that has been lost, stored or unaccounted for from the Leyden caverns. For each of these categories provide supporting calculations, documentation or justification that shows how the numbers were determined.

2. Provide a list of all points where emissions have been vented or left the cavern, such as wells, mine shafts or gas migration, and how much gas has been released through these points. Include information on sources that in the past may or have emitted gas and procedures that were taken to prevent any further gas release or any other reasons that gas may no longer be expected to vent from these areas.

3. Provide information on Xecl's activities to provide the public with information regarding the one mile buffer area around Leyden designated the "Protection Zone." This includes information to inform home owners, drillers or any other person that may be affected by this zone.

4. Are there any programs to monitor for methane around the area? This includes programs that may be in place to monitor methane in homes. Provide information on these programs. Has any of this monitoring been done in locations near the inferred subsurface fracture defined in the seismic line GR-5?

5. Provide information about any current and future plans and programs to monitor shallow soil gas in and around the Leyden facility. Also, describe the results and conclusions of any past monitoring programs and supporting data.

6. Provide information about any current and future plans and programs to monitor subsurface soil gas in and around the Leyden facility. Also, describe the results and conclusions of any past monitoring programs and supporting data.

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Your response to this requested information must be certified by a duly authorized officer or agent of Xcel. by signing the enclosed Statement of Certification (see Enclosure 1) and returning it with your response. All information submitted in response to this request must be certified as true, correct, accurate, and complete by an individual with sufficient knowledge and authority to make such representations on behalf of Xcel.

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This letter in no way affects the obligations of Xcel to comply with other Federal laws and regulations. In addition, nothing in this letter shall be construed to be a waiver by EPA of any rights or remedies under the Clean Air Act.

Xcel may assert a claim of business confidentiality regarding any portion of the information submitted in response to this request (except for emission data). (See 40 CFR 2.201 *et seq.*) Failure to assert such a claim will render all submitted information available to the public without further notice. If you believe the disclosure of specific information would reveal a trade secret, clearly identify such information.

If you have any questions, please contact Joshua Rickard of my staff at 303-312-6460 for technical concerns, or David Rochlin at 303-312-6892 for legal concerns on this matter.

Sincerely,

Carol Rushin
Assistant Regional Administrator,
Office of Enforcement, Compliance, &
Environmental Justice

From: Roland Hea
To: E, King, Robert
Date: 5/31/05 4:48PM
Subject: Re: Natural Gas Venting at Leyden

Bob,

Thanks for your letter. It addresses the questions I had regarding emissions from the facility, and at this point I don't believe there are any outstanding issues.

In answer to your question regarding flaring during the planned testing on the Consolidated Mutual Water well, based on your description of what Xcel plans to do, I agree that this activity would fall under the APEN exemption for petroleum industry flares, provided that the uncontrolled emissions of any pollutant are less than 5 tons per year.

Please let me know if you have more questions or need additional information.

Thanks,
Roland

Roland C. Hea, P.E.
Permitting Section Supervisor
Air Pollution Control Division
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530
303-692-3252
303-782-0278 (Fax)
roland.hea@state.co.us

>>> "King, Robert E" <Robert.King@XCELENERGY.COM> 05/25/05 09:17AM >>>
Roland,

Here is the information we discussed, sorry for taking so long. A hard copy is being put in the mail today.

Let me know if you have questions.

Bob

<<Leydenventingltr.doc>>

STATE OF COLORADO

Oil and Gas Conservation Commission
1120 Lincoln Street, Suite 801
Denver, CO 80203
Phone: (303) 894-2100 ext. 115
Fax: (303) 894-2109
E-Mail: tricia.beaver@state.co.us
Website: www.oil-gas.state.co.us

Patricia C. Beaver, C.P.G.
Hearings Manager

Suzanne Stevenson/P2/R8/USEPA/US

06/14/2005 01:08 PM

To: Carol Campbell/P2/R8/USEPA/US@EPA, David Hogle/RA/R8/USEPA/US@EPA, David Rochlin/ENF/R8/USEPA/US@EPA, Erin Perkins/RC/R8/USEPA/US@EPA, Hans Buenning/P2/R8/USEPA/US@EPA, Nancy Morlock/P2/R8/USEPA/US@EPA, Randy Breeden/P2/R8/USEPA/US@EPA, Sara Laumann/RC/R8/USEPA/US@EPA, Tom Aalto/P2/R8/USEPA/US@EPA, Valois Shea/P2/R8/USEPA/US@EPA

cc:

bcc:

Subject: Leyden follow-up meeting

Hello All

This is a reminder of the Leyden update meeting tommarrow in the Wetlands room (Conference Center) at 11:00-12:00 We will be using the following agenda.

Agenda Leyden June 15, 11:00-12:00 Wetlands room

(b) [redacted]

Erin: (b) (5) (DPP) [redacted]

[redacted]

(b) (5) (DP) [redacted]

(b) (5) (DPP)

(b) (5) (DPP) [redacted]

[redacted]

I hope this makes sense to everyone. Let me know if you have any questions.

Hans Buenning
US EPA, Region 8 (8P-AR)
999 18th Street, Suite 300
Denver, CO 80202-2466
303-312-6438

Randy Breeden/P2/R8/USEPA/US
06/02/2005 09:51 AM

To Hans Buenning/P2/R8/USEPA/US@EPA
cc
bcc
Subject Fw: Leyden

FYI, sorry I didn't send it to you with the others.

----- Forwarded by Randy Breeden/P2/R8/USEPA/US on 06/02/2005 09:51 AM -----

Randy Breeden/P2/R8/USEPA/US
06/02/2005 09:16 AM

To Suzanne Stevenson/P2/R8/USEPA/US, Carol Campbell/P2/R8/USEPA/US
cc Tom Aalto/P2/R8/USEPA/US@EPA, Nancy Morlock/P2/R8/USEPA/US@EPA
Subject Leyden

(b) (5) (DPP) [redacted]

[redacted]

Randy

Tom Aalto/P2/R8/USEPA/US
05/23/2005 12:08 PM

To Sabrina Forrest/EPR/R8/USEPA/US@EPA

cc Debra Ehlert/EPR/R8/USEPA/US@EPA, Nancy Morlock/P2/R8/USEPA/US@EPA, Suzanne Stevenson/P2/R8/USEPA/US@EPA, Randy Breeden/P2/R8/USEPA/US@EPA, Hans Buenning/P2/R8/USEPA/US@EPA

bcc

Subject Leyden Facility CERCLA Technical Report

Sabrina,

FYI

(b) (5) (DPP)

[redacted]

[redacted]

Thanks,

Tom

(b) (5) (DPP)

(b) (5) (DPP)

Xcel Energy™

4653 Table Mountain Drive
Golden, Colorado 80403

May 25, 2005

Roland Hea, P.E.
Colorado Department of Public Health and Environment
Air Pollution Control Division
APCD-SSP-B1
4300 Cherry Creek Drive South
Denver, CO. 80246-1530

Re: Natural Gas Venting Associated with Leyden Gas Storage Facility

Dear Mr. Hea:

This letter is in regard to your telephone inquires on May 11, 2005 concerning the venting of natural gas during the closure of the Leyden Gas Storage Facility. Since we talked, I have learned further details about the venting timeframe and amounts.

The Leyden Gas Storage Facility has always stored pipeline quality natural gas for use in supplying the distribution system during periods of peak use. Public Service Company of Colorado (PSCo) stopped using the facility for gas storage and has filled the mine caverns with water. By the end of this year, PSCO will turn the site over to the City of Arvada to use as a water storage facility. Attached is a map showing the Leyden Facility. PSCo has been working to remove as much residual natural gas as possible from the mine under the direction of the Colorado Oil and Gas Conservation Commission (COGCC). Through May 2004, PSCo was using the engines at Leyden to withdraw the gas. After May 2004, there were no longer sufficient volumes of gas being produced to run the engines, so the gas was sent to the permitted flare at the site.

There were numerous wells on the storage site that had been used for withdrawal, but as the water rose the structurally low wells became inundated with water and stopped producing gas. In October 2004, the last well producing gas to the flare was unable to produce enough gas to keep the flare lit, so PSCo was forced to vent the gas. It was never PSCo's intention to vent large qualities of natural gas and all venting was conducted with the safety of the public in mind. Venting was the preferred alternative based on discussions with the COGCC. The following table summarizes the vented volumes for each year. The venting that occurred before October 2004 was from isolated wells that had no pipeline connection to the gathering system, was also performed within the purview of the COGCC.

Leyden Storage Field Venting		
Year	**Well(s)**	**Volumes (cubic feet)**
1999	31	9,200
2000	31	37,400
2001	31	15,700
2002	31	7,600
2003	31	8,800
2004	5, 31, 36	282,900
2005	5, 36	37,000

A gas sample taken August 2, 2004 found that the VOC content was 3.611 mass % VOC and the benzene concentration was assumed to be 0.0039 mass %. The estimated emissions for 2004, which is the year with the highest volume, produced 517 pounds of VOCs and 1 pound of benzene.

The other situation we discussed is the Consolidated Mutual Water well, where the well encountered a natural gas deposit containing an unknown quantity of storage gas from the Leyden Facility. PSCo is still in the process of testing the well to determine its potential yield. PSCo believes that the process of producing this well falls under the Regulation 3 exemption for oil and gas exploration as follows:

II.D.1.lll. Oil and gas exploration and production operations (well site and associated equipment) shall provide written notice to the Colorado Oil and Gas Conservation Commission of proposed drilling locations prior to commencement of such operations. Air Pollutant Emission Notices are not required until after exploration and/or production drilling, workovers, completions, and testing are finished.

During the initial testing of the well, PSCo vented 1,628,000 cubic feet of natural gas. This venting occurred during October 2004 and ceased when it appeared that there was recoverable gas. An average of two gas samples, one taken in April 2004 and the other taken in October 2004, found that the VOC content was 4.602 mass % and the benzene concentration was assumed to be 0.0039 mass %. The estimated emissions for the October 2004 venting produced 3791 pounds of VOCs and 3 pounds of benzene.

Although PSCo submitted an APEN on January 6, 2005 for an engine to be used to recover the gas, further testing still needs to be conducted. To perform this testing, it will be necessary to release gas for three to five days. PSCo's preferred method is to flare the gas during the test. Based on our discussion, the flaring should fall under the APEN/Permit exemption for petroleum industry flares as follows. Please confirm your agreement with this assumption.

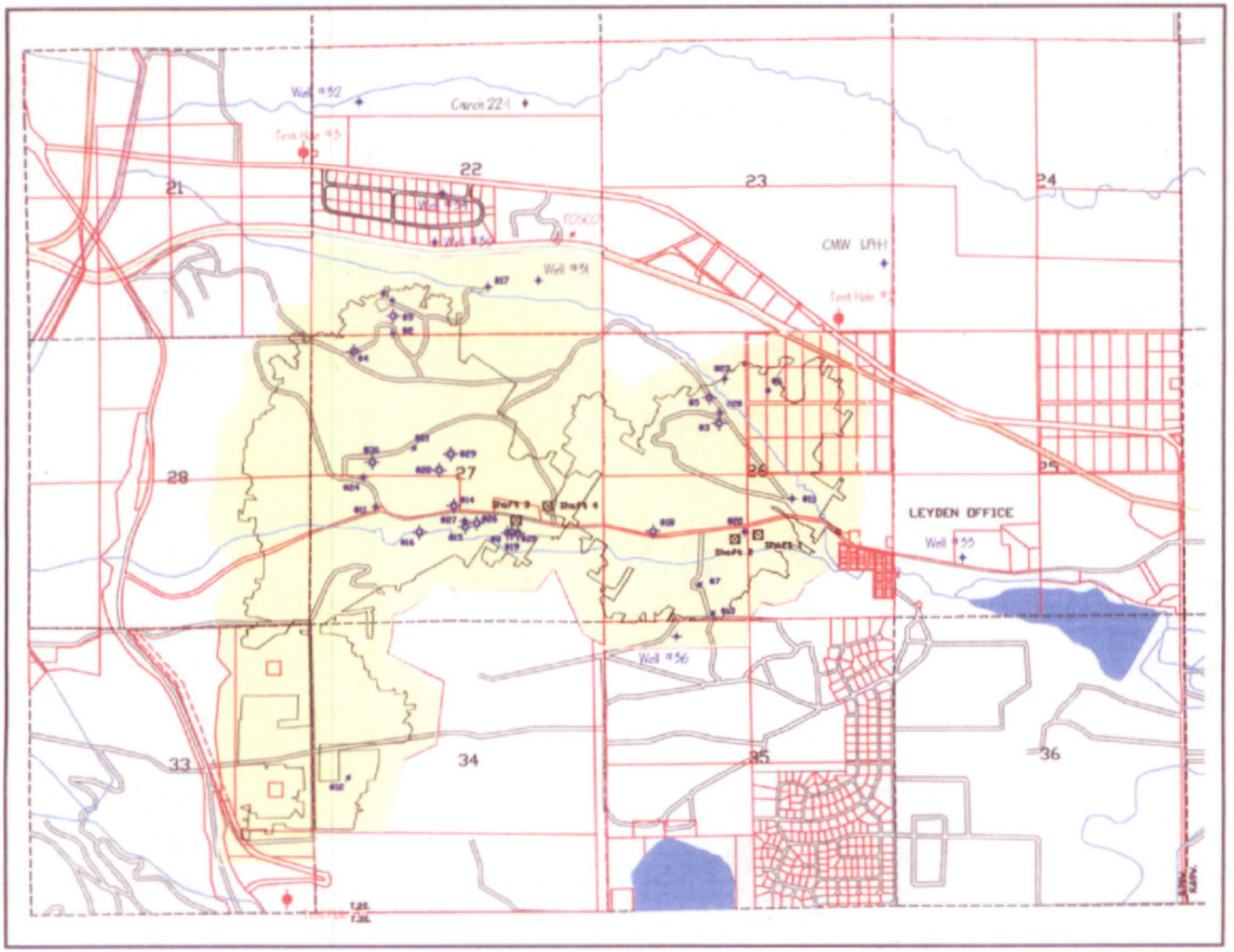
II.D.1.m. Petroleum industry flares, not associated with refineries, combusting natural gas containing no hydrogen sulfide except in trace (less than five hundred parts per million weight) amounts, approved by the Colorado Oil and Gas Conservation Commission and having uncontrolled emissions of any pollutant of less than five tons per year.

If you have any questions, please contact me at 720-497-2114.

Sincerely,

Robert E. King
Environmental Coordinator

cc: Bill Uding
Eldon Lindt
Brian Macke, Director, COGCC
Hans Buenning, EPA
ES File



LEYDEN GAS STORAGE FACILITY
JEFFERSON CO., COLORADO

Scale: 1"=1000'

- Gas Injection-Withdrawal Well
- Observation Well
- Test Hole
- Plugged & Abandoned
- Water Well
- Mine Shaft-Sealed
- Water Supply Well

Hans Buenning/P2/R8/USEPA/US
03/17/2005 08:54 AM

To Tom Aalto/P2/R8/USEPA/US@EPA
cc
bcc
Subject NG Venting

(b) (5) (DPP)

[redacted]

(b) (5) (DPP)

[redacted]

Hans Buenning
US EPA, Region 8 (8P-AR)
999 18th Street, Suite 300
Denver, CO 80202-2466
303-312-6438

Sara Laumann/RC/R8/USEPA/US
05/06/2005 10:49 AM

To: Suzanne Stevenson/P2/R8/USEPA/US@EPA
cc: Carol Campbell/P2/R8/USEPA/US@EPA, David Hogle/RA/R8/USEPA/US@EPA, David Rochlin/ENF/R8/USEPA/US@EPA, Erin Perkins/RC/R8/USEPA/US@EPA, Hans Buenning/P2/R8/USEPA/US@EPA, Nancy Morlock/P2/R8/USEPA/US@EPA, Randy Breeden/P2/R8/USEPA/US@EPA, Steve Tuber/P2/R8/USEPA/US@EPA, Tom Aalto/P2/R8/USEPA/US@EPA, Peter Ornstein/RC/R8/USEPA/US@EPA
bcc:
Subject: Re: Leyden Update

Thanks Suzanne, I've made a minor addition to the list below.

Sara Laumann
Associate Regional Counsel
EPA Region VIII
Phone: 303-312-6443
Fax: 303-312-6859
laumann.sara@epa.gov
Suzanne Stevenson/P2/R8/USEPA/US

Suzanne Stevenson/P2/R8/USEPA/US
05/02/2005 05:36 PM

To: Carol Campbell/P2/R8/USEPA/US@EPA, Hans Buenning/P2/R8/USEPA/US@EPA, Randy Breeden/P2/R8/USEPA/US@EPA, Sara Laumann/RC/R8/USEPA/US@EPA, Tom Aalto/P2/R8/USEPA/US@EPA, Nancy Morlock/P2/R8/USEPA/US@EPA, Erin Perkins/RC/R8/USEPA/US@EPA, David Rochlin/ENF/R8/USEPA/US@EPA, Steve Tuber/P2/R8/USEPA/US@EPA, David Hogle/RA/R8/USEPA/US@EPA
cc:
Subject: Leyden Update

Greetings

On Friday April 29, David Hogle, Carol Campbell, Steve Tuber, Sara Laumann, and myself held a conference call with Brian Macke, Trisha Beaver, and David Shelton, of COGCC.

(b) (5) [redacted]

There are no future meetings scheduled with XCEL at this point.

(b) (5)

Suzanne Stevenson/P2/R8/USEPA/US

05/02/2005 05:36 PM

To: Carol Campbell/P2/R8/USEPA/US@EPA, Hans Buenning/P2/R8/USEPA/US@EPA, Randy Breeden/P2/R8/USEPA/US@EPA, Sara Laumann/RC/R8/USEPA/US@EPA, Tom Aalto/P2/R8/USEPA/US@EPA, Nancy Morlock/P2/R8/USEPA/US@EPA, Erin Perkins/RC/R8/USEPA/US@EPA, David Rochlin/ENF/R8/USEPA/US@EPA, Steve Tuber/P2/R8/USEPA/US@EPA, David Hogle/RA/R8/USEPA/US@EPA

cc

bcc

Subject: Leyden Update

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[redacted]

There are no future meetings scheduled with XCEL at this point.

(b) (5) [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

5/24/05 MTG

(b) (5) (DP) [redacted]

- TUES JUNE 7TH NEXT MTG

(b) (5) (DPP)

(b)(5) (DPP)

(b) (5)

(b) (5)

(b) (5) (DPP)

Tom Aalto/P2/R8/USEPA/US
04/21/2005 10:19 AM

To Randy Breeden/P2/R8/USEPA/US@EPA
cc Carol Campbell/P2/R8/USEPA/US@EPA, Chuck Tinsley/P2/R8/USEPA/US@EPA, David Hogle/RA/R8/USEPA/US@EPA, Suzanne Stevenson/P2/R8/USEPA/US@EPA, Nancy Morlock/P2/R8/USEPA/US@EPA, Hans Buenning/P2/R8/USEPA/US@EPA, Joshua Rickard/ENF/R8/USEPA/US@EPA
bcc
Subject Re: Clarity on Mcf, mcf, mmcf ??

Randy,

(b) (5) (DPP)

[redacted]

Thanks,

Tom

Randy Breeden/P2/R8/USEPA/US

Randy Breeden/P2/R8/USEPA/US
04/21/2005 08:40 AM

To Chuck Tinsley/P2/R8/USEPA/US@EPA
cc Carol Campbell/P2/R8/USEPA/US@EPA, David Hogle/RA/R8/USEPA/US@EPA, Suzanne Stevenson/P2/R8/USEPA/US@EPA, Tom Aalto/P2/R8/USEPA/US@EPA
Subject Re: Clarity on Mcf, mcf, mmcf ??

Thanks Chuck,

(b) (5) (DPP)

[redacted]

Tom Aalto/P2/R8/USEPA/US
04/06/2005 10:35 AM

To Nancy Morlock/P2/R8/USEPA/US@EPA

cc Suzanne Stevenson/P2/R8/USEPA/US@EPA, Hans Buenning/P2/R8/USEPA/US@EPA, Randy Breeden/P2/R8/USEPA/US@EPA, Debrah Thomas/P2/R8/USEPA/US@EPA, Callie Videtich/P2/R8/USEPA/US@EPA

bcc

Subject Leyden and Federal Facilities

Nancy,

(b) (5) (DPP)

[redacted]

[redacted]

[redacted]

Thanks,

Tom

(b) (5) (DPP)

(b) (5) (DPP)

STATE OF COLORADO

Office of the Attorney General
1525 Sherman Street, 5th Floor
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Carol J. Harmon
Assistant Attorney General
Natural Resources and Environment Section

Xcel Energy™

550 15th Street, Suite 900
Denver, Colorado 80202

146-3

January 17, 2005

Colorado Oil and Gas Conservation Commission Staff
Suite 801
1120 Lincoln St
Denver, CO 80203

Quarterly Report of Closure Activities and Monitoring of the Leyden Gas Storage Facility.

Dear OGCC Staff:

This is the sixth quarterly report of activities and accomplishments in the effort to close the Leyden Gas Storage Facility and covers the period from October 1, 2004 to December 31, 2004.

During October, November and December, the City of Arvada injected water into both well #7 and Well #12. Cumulative injection into the cavern is 1435 acre feet of the required 2100 acre feet. The city of Arvada now considers the cavern full and is injecting a minimum amount of water to prevent freezing of their water lines.

Reports of all soil gas measurements are included. No new soil gas sampling locations have been added in the last quarter. Included on the enclosed disk is a copy of the database containing all of the soil gas sampling data.

Field pressure is now being measured monthly at well #5. To obtain a pressure the well is shut in for two days at the end of each month and the maximum buildup pressure is used. Updated plots of Leyden Pressure vs. Volume, Leyden Water Injection History and the two trace plots showing Field Pressures vs. Time and the Volume of Gas in Storage vs. Time are presented in their previous format., These plots are also included in pdf files on the enclosed disk.

Venting of gas from Well #36 continues. As of December 31st a total of 198 MCF had been vented from this well. Venting of gas is continuing from well #5. Well #31 stopped producing gas the first of November.

The only remaining wells are #5, 7, 8, 10, 11, 12, 18, 21, 31, 33, 34, 35, 36. The Consolidated Mutual Water well in sec. 23,T2S, R70W, continues to be monitored. A water pump was installed in October and the well was put on production. All produced gas was metered and vented. The well produced more gas than was anticipated, and was shut in after it had produced 1683 mcf. A pipeline will be installed from the well to the Denver distribution system to allow the produced gas to flow back into the distribution system.

If you would like to discuss any of this information, please don't hesitate to contact me at 303 571-7383.

Sincerely,

Bill Uding
Project Director, HP Gas Engineering

ESN Rocky Mountain | ENVIRONMENTAL SERVICES NETWORK

December 30, 2004

Liz Niemtschik
PSCC/Xcel Energy
550 - 15th Street
Suite 700
Denver, CO 80202

Re: Client Project #: PSCC Leyden Facility
ESN Project #: 0126.20-101865-101870-101872-101881-101886-101902

Dear Liz:

Enclosed is the data package for the analytical project carried out at our laboratory in Golden, Colorado. There were a total of 83 vapor samples submitted for the determination of the following analysis:

- C_1-C_6 Hydrocarbons by NLAG108

Standard turn-around was requested for the samples, and they were completed within that time.

Results for blanks and duplicates are included in the report.

The accompanying project narrative discusses:

- sample receipt and holding times,
- methods and equipment used to determine analyte concentrations,
- calculations to determine final results.

Any problems or unusual circumstances related to this project are discussed in the narrative.

If you should have any questions, please give me a call.

Sincerely,

for

Graham Jackson
Chemist

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ESN Rocky Mountain

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ESN Rocky Mountain | ENVIRONMENTAL SERVICES NETWORK

PROJECT NARRATIVE REPORT

ESN Project Number: 0126.20-101865, -101870, -101872, -101881, -101886, -101902

ESN Client: Xcel Energy
Client Contact: Liz Niemtschik

Date: December 30, 2004

ESN LIMS ID:	Client Sample ID:
101865-01	PSCC-0126-SVW-19
101865-02	PSCC-0126-SVW-18
101865-03	PSCC-0126-SVW-17
101865-04	PSCC-0126-SVW-17-Dup
101865-05	PSCC-0126-SVW-17-Amb
101865-06	PSCC-0126-SVW-16
101865-07	PSCC-0126-SVW-15
101865-08	PSCC-0126-SVW-14
101870-01	PSCC-0126-SVW-44
101870-02	PSCC-0126-SVW-43
101870-03	PSCC-0126-SVW-13
101870-04	PSCC-0126-SVW-45
101870-05	PSCC-0126-SVW-46
101870-06	PSCC-0126-SVW-47
101870-07	PSCC-0126-SVW-48
101870-08	PSCC-0126-SVW-49
101870-09	PSCC-0126-SVW-50
101870-10	PSCC-0126-SVW-51
101870-11	PSCC-0126-SVW-48-Dup
101870-12	PSCC-0126-SVW-48-Amb
101872-01	PSCC-0126-SVW-52
101872-02	PSCC-0126-SVW-53
101872-03	PSCC-0126-SVW-39
101872-04	PSCC-0126-SVW-41
101872-05	PSCC-0126-SVW-42
101872-06	PSCC-0126-DH3W
101881-01	PSCC-0126-DH3S
101881-02	PSCC-0126-DH3E
101881-03	PSCC-0126-DH3N
101881-04	PSCC-0126-DH3N-Dup
101881-05	PSCC-0126-DH3N-Amb
101881-06	PSCC-0126-DH10N
101881-07	PSCC-0126-DH10W
101881-08	PSCC-0126-DH10S
101881-09	PSCC-0126-DH10E
101881-10	PSCC-0126-SVW-04
101881-11	PSCC-0126-SVW-02
101881-12	PSCC-0126-SVW-01
101881-13	PSCC-0126-SVW-38
101881-14	PSCC-0126-SVW-38-Dup
101881-15	PSCC-0126-SVW-38-Amb
101881-16	PSCC-0126-SVW-37
101881-17	PSCC-0126-SVW-34
101881-18	PSCC-0126-SVW-33

ESN LIMS ID:	Client Sample ID:
101881-19	PSCC-0126-DH09S
101881-20	PSCC-0126-DH09E
101881-21	PSCC-0126-DH09N
101881-22	PSCC-0126-DH09W
101881-23	PSCC-0126-DH06S
101881-24	PSCC-0126-DH06W
101881-25	PSCC-0126-DH06N
101881-26	PSCC-0126-DH06E
101881-27	PSCC-0126-DH08W
101881-28	PSCC-0126-DH08N
101881-29	PSCC-0126-DH08E
101881-30	PSCC-0126-DH08S
101886-01	PSCC-0126-SVW-11
101886-02	PSCC-0126-SVW-10
101886-03	PSCC-0126-SVW-09
101886-04	PSCC-0126-SVW-07
101886-05	PSCC-0126-SVW-06
101886-06	PSCC-0126-SVW-28
101886-07	PSCC-0126-SVW-29
101886-08	PSCC-0126-SVW-30
101886-09	PSCC-0126-SVW-30-Amb
101886-10	PSCC-0126-DH7E
101886-11	PSCC-0126-DH7W
101886-12	PSCC-0126-DH7S
101886-13	PSCC-0126-DH7N
101886-14	PSCC-0126-SVW-40
101886-15	PSCC-0126-SVW-31
101886-16	PSCC-0126-SVW-32
101886-17	PSCC-0126-SVW-35
101886-18	PSCC-0126-TB-1122
101886-19	PSCC-0126-TB-1124R
101902-01	PSCC-0126-SVW-27
101902-01-LD	PSCC-0126-SVW-27-LD
101902-02	PSCC-0126-SVW-26
101902-03	PSCC-0126-SVW-25
101902-04	PSCC-0126-SVW-24
101902-05	PSCC-0126-SVW-23
101902-06	PSCC-0126-SVW-22
101902-07	PSCC-0126-SVW-21
101902-08	PSCC-0126-SVW-20
101902-09	PSCC-0126-TB-1206
	PSCC-0126-TB-1109
	PSCC-0126-TB-1119

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Sample Receipt:
The samples for this project were received from the ESN Rocky Mountain Field Services Division and were accompanied by a chain-of-custody form. The samples and their containers appeared to be in good condition and the chain of custody form was complete and accurate.

Holding Times:
All samples were prepared and analyzed within the method required holding times.

Methodology:
The determinations were carried out using modified SW-846 Methods or appropriate Methods as noted below:

ANALYSIS	METHOD	EXTRACTION	CLEAN-UP	INSTRUMENT INTRODUCTION	DETECTOR
C_1-C_8 Hydrocarbons	NLAG108	NLAG108	None	Injection	FID

Laboratory Equipment:

- *Hewlett-Packard 5890 Series II Gas Chromatograph:* This instrument has two flame ionization detectors (FID) and two ten-port gas valves with sample loops. This instrument is used for NLAG108 and NLAG110 analyses.

Calibrations / Calculations:
The laboratory instruments are calibrated using method appropriate standards. On each additional project day the calibration is verified with a mid-level Continuing Calibration Verification (CCV). Calculations are carried out by the data system to compute the actual concentration of the analyte in the original sample. Results are reported on an as received basis.

ANALYSIS OF PURGEABLE OR DIRECTLY INJECTIBLE ANALYTES			
Method	**Initial Cal. Curve**	**Default Sample Volume/Mass**	**Calculation / Reporting Units**
C_1-C_6 Hydrocarbons, NLAG108	5-point	5 cc	The GC is calibrated in ppb molar volume. Results are converted to ppm molar volume.

Initial Calibration Verification (ICV):
A Second Source Calibration Standard is analyzed after each calibration run (ICAL) to verify the accuracy of the original calibration standards. All calculated ICV recoveries were within QC limits.

Blanks:
A blank is used after each calibration run (ICAL), continuing calibration verification (CCV), and after samples determined to have high concentrations of analytes to verify system cleanliness. Trip blanks were also provided with the sample kits for identification of contaminants during transportation.

Laboratory Duplicates:
Duplicate analyses are run on samples in order to verify instrument precision. The analyst randomly selects a sample for duplication where sample volume is sufficient.

Laboratory Control Sample (LCS):
A sample representing laboratory reagents and containers is spiked (LCS) with a Second Source Calibration Standard to demonstrate the laboratory's ability to extract/purge and accurately quantitate the analytes of interest from a clean sample matrix. All calculated LCS recoveries were within QC limits.

John Hudson for
Graham Jackson, Chemist

1/5/2005
Date

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Final Data

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CLIENT: PSCC/XCEL Energy
CLIENT PROJECT NO.:
ESN PROJECT NO.: 0126.20
LIMS NO.: 101865, 101870, 101872, 101881, 101886, 101902
PROJECT NAME: Leyden

C_1-C_6 Hydrocarbons by FID Gas Chromatography

GAS CONCENTRATIONS BY VOLUME
(Parts-per-Million by Volume)

ESN LAB ID	Client SAMPLE ID	Sample Date	Receive Date	Analysis Date	Data Notes*	Methane	Ethane	Ethene	Propane	Propene	iButane	nButane	Butene	iPentane	nPentane	Pentene	iHexane	nHexane
101881-26	DH06E	11/19/04	11/19/04	11/22/04		0.5	0.01	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
101881-25	DH06N	11/19/04	11/19/04	11/22/04		0.3	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
101881-23	DH06S	11/19/04	11/19/04	11/22/04		0.7	0.00	0.02	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
101881-24	DH06W	11/19/04	11/19/04	11/22/04		0.4	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101881-29	DH08E	11/19/04	11/19/04	11/22/04		0.4	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101881-28	DH08N	11/19/04	11/19/04	11/22/04		0.5	0.01	0.02	0.02	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
101881-30	DH08S	11/19/04	11/19/04	11/22/04		0.5	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
101881-27	DH08W	11/19/04	11/19/04	11/22/04		0.7	0.01	0.02	0.03	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
101881-20	DH09E	11/19/04	11/19/04	11/22/04		0.8	0.00	0.02	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00
101881-21	DH09N	11/19/04	11/19/04	11/22/04		0.1	0.00	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00
101881-19	DH09S	11/19/04	11/19/04	11/22/04		0.1	0.00	0.03	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00
101881-22	DH09W	11/19/04	11/19/04	11/22/04		0.6	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
101881-9	DH10E	11/18/04	11/18/04	11/19/04		0.3	0.01	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101881-6	DH10N	11/18/04	11/18/04	11/19/04		0.5	0.00	0.02	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
101881-8	DH10S	11/18/04	11/18/04	11/19/04		0.4	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
101881-7	DH10W	11/18/04	11/18/04	11/19/04		2.4	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101881-2	DH3E	11/18/04	11/18/04	11/19/04		0.8	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101881-3	DH3N	11/18/04	11/18/04	11/19/04		0.6	0.00	0.03	0.03	0.01	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00
101881-5	DH3N-Amb	11/18/04	11/18/04	11/19/04		2.6	0.01	0.02	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00
101881-4	DH3N-Dup	11/18/04	11/18/04	11/19/04	FD	0.7	0.01	0.02	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
101881-1	DH3S	11/18/04	11/18/04	11/19/04		0.5	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101872-6	DH3W	11/10/04	11/10/04	11/11/04		0.8	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
101886-10	DH7E	11/22/04	11/22/04	11/24/04		0.9	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
101886-13	DH7N	11/22/04	11/22/04	11/24/04		1.0	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101886-12	DH7S	11/22/04	11/22/04	11/24/04		0.6	0.00	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
101886-11	DH7W	11/22/04	11/22/04	11/24/04		1.9	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
101881-12	SVW-01	11/19/04	11/19/04	11/19/04		0.3	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
101881-11	SVW-02	11/19/04	11/19/04	11/19/04		0.5	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	SVW-03					Well could not be located												
101881-10	SVW-04	11/19/04	11/19/04	11/19/04		0.5	0.00	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101886-5	SVW-08	11/22/04	11/22/04	11/24/04		0.8	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
101886-4	SVW-07	11/22/04	11/22/04	11/24/04		0.5	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
	SVW-08					Well damaged, could not sample												
101886-3	SVW-09	11/22/04	11/22/04	11/24/04		0.7	0.01	0.03	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
101886-2	SVW-10	11/22/04	11/22/04	11/24/04		0.6	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101886-1	SVW-11	11/22/04	11/22/04	11/24/04		0.8	0.00	0.03	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

Note abbreviations on last page

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Final Data

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CLIENT: PSCC/XCEL Energy

CLIENT PROJECT NO.:
ESN PROJECT NO.: 0126.20
LIMS NO.: 101865, 101870, 101872, 101881, 101886, 101902
PROJECT NAME: Leyden

C_1-C_8 Hydrocarbons by FID Gas Chromatography

GAS CONCENTRATIONS BY VOLUME
(Parts-per-Million by Volume)

ESN LAB ID	Client SAMPLE ID	Sample Date	Receive Date	Analysis Date	Data Notes*	Methane	Ethane	Ethene	Propane	Propene	iButane	nButane	Butene	iPentane	nPentane	Pentene	iHexane	nHexane
101870-3	SVW-13	11/9/04	11/9/04	11/10/04		0.3	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101865-8	SVW-14	11/8/04	11/8/04	11/9/04		3.2	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00
101865-7	SVW-15	11/8/04	11/8/04	11/9/04		88.8	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101865-6	SVW-16	11/8/04	11/8/04	11/9/04		0.8	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
101865-3	SVW-17-Amb	11/8/04	11/8/04	11/9/04		3.2	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101865-5	SVW-17	11/8/04	11/8/04	11/9/04		0.5	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
101865-4	SVW-17-Dup	11/8/04	11/8/04	11/9/04	FD	0.4	0.00	0.02	0.02	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
101865-2	SVW-18	11/8/04	11/8/04	11/9/04		0.4	0.00	0.03	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101886-1	SVW-19	11/8/04	11/8/04	11/9/04		0.9	0.00	0.03	0.02	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00
101902-8	SVW-20	12/6/04	12/6/04	12/8/04		2.9	0.01	0.01	0.04	0.01	0.02	0.05	0.00	0.02	0.01	0.00	0.00	0.03
101902-7	SVW-21	12/6/04	12/6/04	12/8/04		1.9	0.01	0.01	0.02	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01
101902-6	SVW-22	12/6/04	12/6/04	12/8/04		0.6	0.00	0.02	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
101902-5	SVW-23	12/6/04	12/6/04	12/8/04		0.5	0.01	0.02	0.03	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
101902-4	SVW-24	12/6/04	12/6/04	12/8/04		0.5	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00
101902-3	SVW-25	12/6/04	12/6/04	12/8/04		0.9	0.00	0.05	0.00	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
101902-2	SVW-26	12/6/04	12/6/04	12/8/04		0.8	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
101902-1	SVW-27	12/6/04	12/6/04	12/8/04		0.8	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01
101902-1-LD	SVW-27-LD	12/6/04	12/6/04	12/8/04	LD	0.8	0.00	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
101886-6	SVW-28	11/22/04	11/22/04	11/24/04		1.1	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101886-7	SVW-29	11/22/04	11/22/04	11/24/04		0.8	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101886-8	SVW-30	11/22/04	11/22/04	11/24/04		0.6	0.00	0.02	0.00	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00
101886-9	SVW-30-Amb	11/22/04	11/22/04	11/24/04		2.9	0.01	0.01	0.03	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
101886-15	SVW-31	11/24/04	11/24/04	11/24/04		1.3	0.01	0.01	0.02	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00
101886-16	SVW-32	11/24/04	11/24/04	11/24/04		0.9	0.01	0.01	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
101881-18	SVW-33	11/19/04	11/19/04	11/19/04		0.3	0.00	0.04	0.02	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00
101881-17	SVW-34	11/19/04	11/19/04	11/19/04		0.4	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101886-17	SVW-35	11/24/04	11/24/04	11/24/04		1.6	0.02	0.01	0.03	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	SVW-36					Well could not be located												
101881-16	SVW-37	11/19/04	11/19/04	11/19/04		0.5	0.00	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101881-13	SVW-38	11/19/04	11/19/04	11/19/04		2.7	0.03	0.02	0.03	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
101881-15	SVW-38-Amb	11/19/04	11/19/04	11/19/04		2.7	0.04	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01
101881-14	SVW-38-Dup	11/19/04	11/19/04	11/19/04	FD	2.7	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101872-3	SVW-39	11/10/04	11/10/04	11/11/04		0.8	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101886-14	SVW-40	11/24/04	11/24/04	11/24/04		0.6	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00
101872-4	SVW-41	11/10/04	11/10/04	11/11/04		0.5	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
101872-5	SVW-42	11/10/04	11/10/04	11/11/04		0.8	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
101870-2	SVW-43	11/9/04	11/9/04	11/10/04		0.5	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00

Note abbreviations on last page

ESN Rocky Mountain
130 Capital Drive, Suite C
Golden, CO 80401

Final Data

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CLIENT: PSCC/XCEL Energy
CLIENT PROJECT NO.:
ESN PROJECT NO.: 0126.20
LIMS NO.: 101865, 101870, 101872, 101881, 101888, 101902
PROJECT NAME: Leyden

C_1-C_6 Hydrocarbons by FID Gas Chromatography

GAS CONCENTRATIONS BY VOLUME
(Parts-per-Million by Volume)

ESN LAB ID	Client SAMPLE ID	Sample Date	Receive Date	Analysis Date	Data Notes*	Methane	Ethane	Ethene	Propane	Propene	iButane	nButane	Butene	iPentane	nPentane	Pentene	iHexane	nHexane
101870-1	SVW-44	11/8/04	11/9/04	11/10/04		0.8	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
101870-4	SVW-45	11/8/04	11/9/04	11/10/04		1.4	0.01	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101870-5	SVW-46	11/8/04	11/9/04	11/10/04		2.7	0.01	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
101870-6	SVW-47	11/8/04	11/9/04	11/10/04		2.0	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
101870-7	SVW-48	11/8/04	11/9/04	11/10/04		1.6	0.00	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101870-12	SVW-48-Amb	11/8/04	11/9/04	11/10/04		2.7	0.02	0.03	0.06	0.04	0.01	0.03	0.01	0.01	0.00	0.00	0.01	0.03
101870-11	SVW-48-Dup	11/8/04	11/9/04	11/10/04	FD	1.4	0.00	0.03	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101870-8	SVW-49	11/8/04	11/9/04	11/10/04		0.6	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101870-9	SVW-50	11/8/04	11/9/04	11/10/04		0.4	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
101870-10	SVW-51	11/8/04	11/9/04	11/10/04		6.3	0.04	0.01	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
101872-1	SVW-52	11/10/04	11/10/04	11/11/04		0.5	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101872-2	SVW-53	11/10/04	11/10/04	11/11/04		2.1	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
	PSCC-0126-TB-1109	11/8/04	11/8/04	11/9/04	TB	0.3	0.00	0.05	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
	PSCC-0126-TB-1119	11/19/04	11/19/04	11/19/04	TB	0.3	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
101888-18	PSCC-0126-TB-1122	11/22/04	11/24/04	11/24/04	TB	0.4	0.00	0.02	0.03	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.00	0.00
101888-19	PSCC-0126-TB-1124R	11/24/04	11/24/04	11/24/04	TB	0.3	0.00	0.01	0.01	0.02	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00
101902-9	PSCC-0126-TB-1206	12/6/04	12/6/04	12/6/04	TB	0.1	0.00	0.04	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	REPORTING LIMITS:					0.10	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

*ABBREVIATIONS
TB = Trip Blank
MB = Method Blank
TB = Trip Blank
FD = Field Duplicate
LD = Laboratory Duplicate
LS = Laboratory Spike
D = Dilution

DATA FLAGS
J = an estimated concentration outside the calibration range of the method
b = analyte also appeared in the associated method blank for this sample

Hans
Buenning/P2/R8/USEPA/US
04/21/2005 11:02 AM

To Tom Aalto/P2/R8/USEPA/US@EPA

cc Carol Campbell/P2/R8/USEPA/US@EPA, Chuck Tinsley/P2/R8/USEPA/US@EPA, David Hogle/RA/R8/USEPA/US@EPA, Joshua Rickard/ENF/R8/USEPA/US@EPA, Nancy Morlock/P2/R8/USEPA/US@EPA, Randy Breeden/P2/R8/USEPA/US@EPA, Suzanne Stevenson/P2/R8/USEPA/US@EPA, Callie Videtich/P2/R8/USEPA/US@EPA

bcc

Subject Re: Clarity on Mcf, mcf, mmcf ??

(b)(5)(DPP)

[redacted]

[redacted]

-Hans

All: conventionally, 1 mcf = 1,000 cubic feet of gas. 1mmcf = 1,000,000 cf = 1Mcf. 1BCF=1bcf = 1 mMcf (which I've never seen reported) or I've seen it reported once as 1mmmcf on a scout ticket. Probably was a typo.
Tom Aalto/P2/R8/USEPA/US

Tom Aalto/P2/R8/USEPA/US
04/21/2005 10:19 AM

To Randy Breeden/P2/R8/USEPA/US@EPA

cc Carol Campbell/P2/R8/USEPA/US@EPA, Chuck Tinsley/P2/R8/USEPA/US@EPA, David Hogle/RA/R8/USEPA/US@EPA, Suzanne Stevenson/P2/R8/USEPA/US@EPA, Nancy Morlock/P2/R8/USEPA/US@EPA, Hans Buenning/P2/R8/USEPA/US@EPA, Joshua Rickard/ENF/R8/USEPA/US@EPA

Subject Re: Clarity on Mcf, mcf, mmcf ??

Randy,

(b) (5) (DPP)
(b) (5) (DPP)

[redacted]

(b) (5) (DPP)

(b) (5)

Thanks,

Tom

Randy Breeden/P2/R8/USEPA/US

Randy Breeden/P2/R8/USEPA/US
04/21/2005 08:40 AM

To Chuck Tinsley/P2/R8/USEPA/US@EPA

cc Carol Campbell/P2/R8/USEPA/US@EPA, David Hogle/RA/R8/USEPA/US@EPA, Suzanne Stevenson/P2/R8/USEPA/US@EPA, Tom Aalto/P2/R8/USEPA/US@EPA

Subject Re: Clarity on Mcf, mcf, mmcf ??

Thanks Chuck,

(b) (5) (DPP)

How Many? A Dictionary of Units of Measurement

M

M [1]
informal abbreviation for million in expressions where the base unit is understood, as in "500M hard drive" (500 megabytes or mebibytes). In chemistry, M is the symbol for "molar" (see below).

M [2]
the Roman numeral 1000, sometimes used in symbols to indicate a thousand, as in **Mcf**, a traditional symbol for 1000 cubic feet. Given the widespread use of M to mean one million, this older use of M to mean 1000 is very confusing and should be scrapped.

Ma
a symbol for one million years, often used in astronomy and geology. The "a" stands for the Latin *annum*.

mab
symbol for "meters above bottom" (bottom of the sea), a unit used in oceanography.

mace
a traditional Chinese unit for weighing precious metals, especially silver. In the European colonial period, the mace was considered equal to 0.1 tael or liang; this would be 2/15 ounce or about 3.78 grams.

Mach or mach (M or Ma)
a measure of relative velocity, used to express the speed of an aircraft relative to the speed of sound. The name of the unit is often placed before the measurement. Thus "Mach 1.0" is the speed of sound, "Mach 2.0" is twice the speed of sound, and so on. (The actual speed of sound varies, depending on the density and temperature of the atmosphere. At 0 °C and a pressure of 1 atmosphere the speed of sound is about 1088 ft/s, 331.6 m/s, or 741.8 mi/h). The mach speed is important to the control of an aircraft, especially at speeds close to or exceeding Mach 1.0. The unit is named for the Austrian physicist Ernst Mach (1838-1916).

maf or Maf
a symbol for one million acre feet. This symbol, commonly used in reservoir management in the U.S., should be written **Maf**. 1 Maf = about 1.2335 billion (10^9) cubic meters.

magnitude (mag) [1]
a unit traditionally used in astronomy to express the apparent brightness of stars, planets, and other objects in the sky. For centuries, the brightest stars were said to be of the "first magnitude," with fainter ones of the "second magnitude" and so on down to "sixth magnitude" for the faintest stars visible to the unaided eye. When it became possible to measure stellar brightnesses precisely, it was discovered that stars of a given traditional magnitude were roughly 2.5 times brighter than stars of the next magnitude. Astronomers agreed to define the magnitude scale so that a difference of exactly 5.0 mag corresponds to a brightness difference of exactly 100 times. A difference of 1.0 mag then corresponds to a brightness difference of the fifth root of 100 or about 2.512 times. The scale is upside down: brighter stars have lower, not higher magnitudes, in keeping with the historical origin of the scale. The zero point (0.0 mag) is set arbitrarily so that the stars historically listed as "first magnitude" have magnitude measurements of 1.5 mag or brighter. The brightest stars and planets have negative magnitudes on this scale.

magnitude (mag) [2]
a unit used in earth science to measure the intensity of earthquakes. Geologists actually use several scales to measure earthquake intensity, but the one best known to the public is the Richter magnitude scale, developed in 1935 by Charles F. Richter (1900-1985) of the California Institute of Technology. The Richter magnitude is computed from the measured amplitude and frequency

of the earthquake's shock waves received by a seismograph, adjusted to account for the distance between the observing station and the epicenter of the earthquake. An increase of 1.0 in the Richter magnitude corresponds to an increase of 10 times in the amplitude of the waves. The most powerful earthquakes recorded so far had magnitudes of about 8.5. The Richter magnitude measures the intensity of the earthquake itself, not the intensity of the earthquake's effects: the effects also depend on the depth of the earthquake, the geology of the area around the epicenter, and many other factors. Earthquake effects are rated using the Mercalli scale (see below).

magnum

a traditional unit of volume for wine, generally equal to 2 bottles. This is now exactly 1.5 liters (about 2.114 U.S. quarts).

mahnd

a traditional Arab weight unit equal to about 2.04 pounds or 925 grams.

mål

a Norwegian word for "measure," mål has been used as a name for various traditional Norwegian units. As a land measure, the mål is currently defined to be the same as the dekare, that is, exactly 1000 square meters (0.1 hectare or 0.2471 acre). The mål has also been used as a unit of volume equal to the dekaliter (10 liters).

mandel

a traditional German unit of quantity equal to 15.

man hour

a common unit of labor equal to the work of one person for one hour. The less restrictive term **person hour** is gradually coming into use.

manpower

an informal unit of power equal to 0.1 horsepower or about 74.57 watts. The unit seems to have been invented by American engineers.

manzana

a traditional unit of land area in Central America. The manzana is the area of a square 100 varas on a side; it thus varies according to the length of the vara. The Costa Rican manzana equals 0.698 896 hectares or about 1.727 acres. Very similar units are used in Guatemala, Honduras, and Nicaragua. The word *manzana* means an apple, but the unit is probably related to *manzanar*, orchard.

marathon

a traditional unit of distance used in athletics. The length of a marathon is exactly 26 miles 385 yards, or 12 millimeters less than 42 195 meters. Invented for the first modern Olympic Games at Athens in 1896, the marathon recalls a run made in 490 BC by a Greek soldier (possibly Pheidippides) to bring to Athens the news of the Greek victory over the Persians at the Battle of Marathon. However, the actual distance from Marathon to Athens is only about 36.75 kilometers. The 1896 run was exactly 40 kilometers from the Marathon Bridge to the Olympic Stadium. At the 1908 Olympics in London, a course of 26 miles 385 yards brought runners from Windsor Castle to White City Stadium (the story is that exactly 26 miles was intended, but Queen Alexandra insisted that the finish line be moved in front of the royal box). The marathons at the Olympic Games varied in length until the 1924 Olympics in Paris, when the International Olympic Committee adopted the 1908 London distance as official.

marc, marco, or mark

traditional units of weight in various countries of Western Europe. In each country the unit equals 1/2 the unit corresponding to the English pound. Thus the French **marc** equals 1/2 livre, 8 onces or about 244.75 grams; the Spanish **marco** equals 1/2 libra or about 230 grams; the German mark equals 1/2 pfund or about 280.5 grams; and the English mark equals 8 ounces or 226.8 grams. The English unit was used almost entirely for measuring precious metals.

marine league

an informal name for the league as used at sea: a unit of distance generally equal to 3 nautical

a common symbol for the meter kilopond, a metric unit of torque equal to 9.806 65 newton meters (N·m) or 7.233 01 pound feet.

MM

an abbreviation for one million, seen in a few traditional units such as those listed below. The abbreviation is meant to indicate one thousand thousand, M being the Roman numeral 1000. However, MM actually means 2000, not one million, in Roman numeration. Since the single letter M is now used commonly for one million, the use of the double MM is confusing and strongly discouraged.

m/m

an abbreviation for "by mass," used in chemistry and pharmacology to describe the concentration of a substance in a mixture or solution. 2% m/m means that the mass of the substance is 2% of the total mass of the solution or mixture.

MMb, MMbo

symbols for one million barrels of oil; see megabarrel above.

MMBF or MMBM

symbols sometimes used in U.S. forestry for one million board feet. One MMBF represents a volume of 83 333 cubic feet or 2360 cubic meters. "BM" stands for "board measure."

MMBtu

a traditional symbol for one million Btu (about 1.055 057 gigajoules (GJ)), a unit used widely in the energy industry. This unit is also called the **dekatherm**.

MMcf

a symbol for one million cubic feet (28 316.85 m^3, or 28.316 85 megaliters). Similarly, **MMMcf** is used for one billion cubic feet.

MMcfe

a symbol used in the natural gas industry for one million cubic feet of gas equivalent (cfe). This is really an energy unit equal to about 1.091 terajoules (TJ). Similarly, **MMMcfe** is used for one billion cubic feet of gas equivalent: 1.091 petajoules (PJ).

MMM

an abbreviation for one billion (10^9), seen in a few traditional units such as those mentioned above. The abbreviation is meant to indicate one thousand thousand thousand, M being the Roman numeral 1000. However, MMM actually means 3000, not one billion, in Roman numeration.

MMscfd

symbol for one million standard cubic feet per day, the customary unit for measuring the production and flow of natural gas. "Standard" means that the measurement is adjusted to standard temperature (60 °F or 15.6 °C) and pressure (1 atmosphere).

-mo

a "unit" traditionally used in printing to describe the page size of a book or other publication. In traditional printing, large sheets are printed, folded, and then cut to manufacture the book. After the cut is made, the sheet has been divided into a certain number of "leaves." Each leaf, folded at the spine of the book, comprises two pages front and back. When sheets were cut to form 4, 8, or 12 leaves, the resulting pages were described as quarto (4to), octavo (8vo) or duodecimo (12mo), respectively. Later, the suffix -mo from duodecimo was made into a suffix that can be attached to any number to indicate the number of leaves per sheet; thus 16mo indicates 16 leaves per sheet.
Link: book sizes, from Bookbinding and the Conservation of Books, by Matt T. Roberts and Don Etherington, posted by Stanford University.

moa

an acronym for "minute of angle," that is, for the arcminute (see minute [2], above). This unit is commonly used in target shooting to express the angular size of targets or the spacing between marks on a reticle (the grid of lines seen in the eyepiece of a rifle). By coincidence, 1 moa is very nearly equal to a target size of 1 inch at 100 yards; in fact, 1 moa = 1.047 20 inches at 100 yards

or 10.4720 inches at 1000 yards. In metric units, 1 moa = 2.9089 centimeters at 100 meters.

modified Julian day (MJD)

a count of days used by astronomers, space agencies, and others. Astronomers have long used the Julian day, a count of days beginning at noon Universal Time January 1, 4713 BC, as a means of specifying a date independent of all calendars. One problem with this is that the numbers are large, more than 2.4 million, for current dates. Also, the old astronomical custom of beginning a day at noon is awkward for converting Julian dates to the ordinary calendar. To ease these problems, space engineers introduced the modified Julian date, equal to the Julian date minus 2 400 000.5. The result is a count of days beginning at 0 hours (midnight) Universal Time on 17 November 1858. Thus (for example) 0 hours 1 January 2005 is MJD 53371.0.

module

a unit of volume for raw cotton in the U.S. When cotton is harvested, machinery is used to compact it into bundles called modules for transportation to the gin. A cotton module is 8 ft by 8 ft by 20 ft, or 1280 cubic feet (about 36.25 cubic meters). This unit is essentially the same as the TEU, the volume of a standard 20 ft container.

Mohs hardness scale

a 1-10 scale for estimating the hardness of a mineral, introduced by the German geologist Friedrich Mohs (1773-1839) in 1812. To apply the scale, one attempts to scratch the mineral with standard minerals assigned hardness numbers as follows: diamond 10, corundum 9, topaz 8, quartz 7, orthoclase 6, apatite 5, fluorite 4, calcite 3, gypsum 2, and talc 1. If, for example, the mineral is scratched by quartz but not by orthoclase, then its hardness is between 6 and 7.

moiety

another name for a half, from the French *moitié*.

molad

Hebrew name for the lunar (synodic) month (see month [1] below). This unit, 29.530 59 days, is crucial in the regulation of the Jewish lunisolar calendar.

molal (m), molar (M)

these notations, traditionally used by chemists to describe the concentration of chemical solutions, often appear to be units of measurement. It's easy to get them confused. The term "molal" describes the concentration of a solution in moles per kilogram of solvent (mol/kg), while "molar" describes a concentration in moles per liter (mol/L). A solution described as 1.0 μM has a concentration of 1.0 μmol/L. These units are not approved by the General Conference on Weights and Measures. Their use is declining, but still substantial.

molar volume

a unit used by chemists and physicists to measure the volumes of gases. The behavior of gases under ordinary conditions (not at very high pressures or very low temperatures) is governed by the Ideal Gas Law. This law says that the volume V of a gas is related to its temperature T and pressure P by the formula PV = nRT, where n is the number of moles of gas present and the gas constant R equals 8.314 joules per mole per kelvin. The molar volume is the volume one mole of gas occupies at standard temperature (273.16 kelvins, or 0 °C) and standard pressure (1 atmosphere, or 101.325 kilopascals). The molar volume is equal to 22.414 liters or 0.7915 cubic foot. (Occasionally the term "molar volume" is used for the volume occupied by a mole of a substance which is not a gas; in such cases the molar volume will be different for each substance.)

mole (mol)

the SI base unit of the *amount* of a substance (as distinct from its mass or weight). Moles measure the actual number of atoms or molecules in an object. An alternate name is **gram molecular weight**, because one mole of a chemical compound is the same number of grams as the molecular weight of a molecule of that compound measured in atomic mass units. The official definition, adopted as part of the SI system in 1971, is that one mole of a substance contains just as many elementary entities (atoms, molecules, ions, or other kinds of particles) as there are atoms in 12 grams of carbon-12 (carbon-12 is the most common atomic form of carbon, consisting of atoms

(b) (5) (DPP)

COGCC/EPA Meeting
April 19, 2005

Introductions	All
Agenda Check in	All
Opening Remarks & Background	Carol Campbell

Findings & Proposed Solutions

Waste	Randy Breeden
Air	Hans Buenning
Drinking Water	

Discussion

Next Steps

(b) (5) (DPP)

LEYDEN KEY AIR POINTS
4/19/05
Meeting with COGCC

- (b) (5) (DPP) [redacted]
- [redacted]
- [redacted]
- [redacted] Someone
- [redacted] Someone.

Suzanne Stevenson/P2/R8/USEPA/US
04/18/2005 03:52 PM

To Hans Buenning/P2/R8/USEPA/US@EPA
cc
bcc
Subject Fw: COGCC mtg 4/19/05 logistics

---- Forwarded by Suzanne Stevenson/P2/R8/USEPA/US on 04/18/2005 03:52 PM ----

Suzanne Stevenson/P2/R8/USEPA/US
04/18/2005 03:50 PM

To Buenning/P2/R8/USEPA/US@EPA, Peter Ornstein/RC/R8/USEPA/US@EPA, Randy Breeden/P2/R8/USEPA/US@EPA, David Rochlin/ENF/R8/USEPA/US, Sara Laumann/RC/R8/USEPA/US, Carol Campbell/P2/R8/USEPA/US, Nancy Morlock/P2/R8/USEPA/US
cc
Subject COGCC mtg 4/19/05 logistics

Hello

I have reserved a van for the meeting tommarrow with Colorado Oil and Gas Commission. Please meet at Carol Campbells office at 9:55. The COGCC meeting will be held from 10:15 to 12:00. COGCC has requested that CDPHE not come to this meeting that only EPA and COGCC attend. Tommarrow we will schedule a follow-up meeting with CDPHE and another with CDPHE and EXCEL. Please come prepared for discussion including any handouts you will be providing.

The COGCC is located at 11th and Lincoln in the Chaucery Building on the 8th floor.

Meeting Agenda

A. Introductions

B. Consensus on Meeting Goals

1. Both EPA and COGCC will gain a clear understanding of EPA's conclusions as a result of EPA's review of 407 COGCC documents on web

   a. Water conclusion
   b. Air conclusion
   c. Waste conclusion

2. EPA and COGCC will jointly develop a general idea of direction and next steps to address conclusions

C. Background

EPA Actions leading to conclusions development

D. Conclusions:

Discussion of conclusions about water

Discussion of conclusions about air

Discussion of conclusions about waste

E. General responses to information provided

F. Next steps

meeting with CDPHE
meeting with CDPHE and EXCEL
Other

LEYDEN KEY AIR POINTS
4/19/05
Meeting with COGCC

- (b) (5) (DPP) [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

(b) (5) (DPP)

(b) (5) [redacted]

1. (b)(5)(DPP) [redacted]
2. [redacted]
3. [redacted]
4. [redacted]
5. [redacted]
6. [redacted]
7. [redacted]

(b) (5) (DPP) [redacted]

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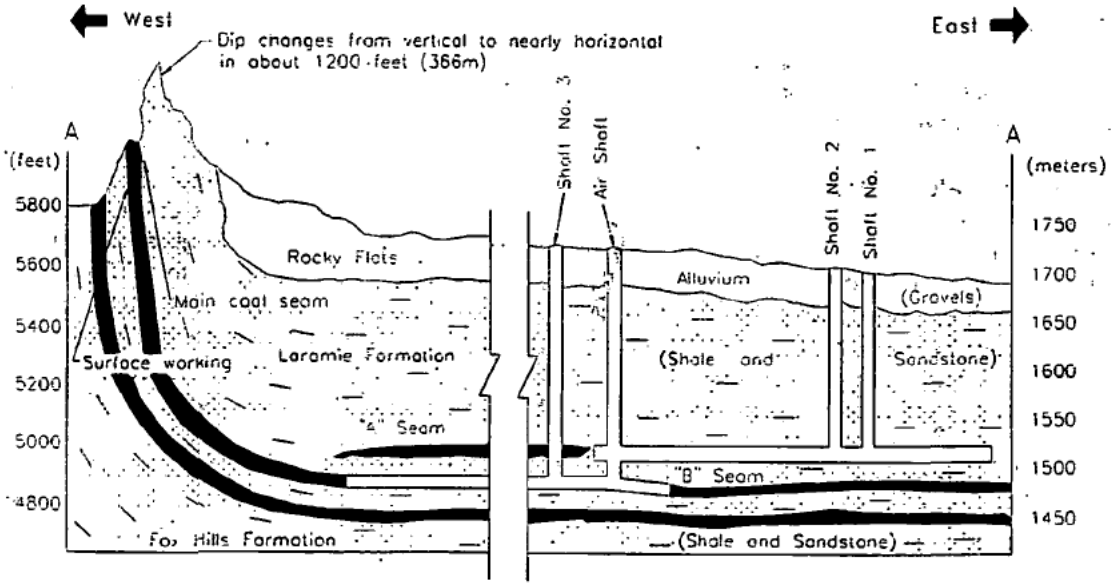
Gas Storage at the Abandoned Leyden Coal Mine near Denver, Colorado

November 25, 1998

Figure 1. Simplified East-West Cross Section of the Leyden Mine
(Modified from PSCo Brochure)



ACKNOWLEDGMENTS

This draft report was prepared under Work Assignment 3-1 of the U.S. Environmental Protection Agency Contract 68-W5-0018 by Raven Ridge Resources, Incorporated, and Penn, Stuart and Eskridge. This report is a technical document meant to be used for information dissemination.

(b) (5) (DPP)

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ESN
ROCKY MOUNTAIN
Environmental
Services Network

Leyden Gas Composition Statement

JULY 2003 QUARTERLY SOIL GAS MONITORING EVENT AT THE SPRING MESA DEVELOPMENT NEAR LEYDEN, COLORADO

FOR

ELDORADO HILLS L.L.C.
AURORA, COLORADO

ESN PROJECT NO. 1180.09

DECEMBER 26, 2003

PREPARED BY
ESN ROCKY MOUNTAIN
GOLDEN, COLORADO
(303) 278-1911

TABLE OF CONTENTS

1. Introduction

In August of 2001, ESN submitted to Eldorado Hills, LLC. and the City of Arvada a "Proposal to Conduct Soil Gas Testing and Monitoring at the Spring Mesa development in Northwest Jefferson County, Section 35, T2S, R70W." The purpose of the project was to investigate and evaluate the site geology for potential gas migration pathways from the nearby Leyden Gas Storage Facility (LGSF) and to investigate and monitor for the presence of storage gas from the LGSF in the surface and near surface soils of the Spring Mesa Property; as well as identify the potential health, safety and environmental effects of storage gas in the rock and soils at the property, if any. The overall project consisted of three phases of work including:

- Phase I: Geologic Data Review
- Phase II: Field Reconnaissance Survey
- Phase III: Monitoring Well Installation and Testing

Phase I reviewed available surface and subsurface geologic and other information regarding the Spring Mesa property, Leyden Coal Mine, Leyden Gas Storage Facility (LGSF), and identified features that could influence gas migration pathways from the LGSF onto the Spring Mesa Property. Potential seepage features include faults or visible natural lineaments (linear features), spring features (which are sometimes fault controlled), old well borings into deeper strata, and any signs of current or past vegetation stress. Potential pathways include wells near the property, fracturing from mine subsidence, etc. These features were specifically targeted in the Phase II "Reconnaissance Gas Survey" and examined using a sensitive field portable gas detection instrument. Phase III looked at features identified above and soil gas monitoring wells were installed at 27 locations based on the requirements of the City of Arvada and findings in Phase I and II. The Phase I and Phase II progress reports were submitted to the City of Arvada on January 10th, 2002, and Phase III report was submitted on March 6, 2002. The first 19 wells were planned in accordance with the original proposal. The addition of 6 wells was to test slight indications of soil gas in the phase II reconnaissance survey. A map of the property and the adjacent Leyden Facility is shown in Figure 1.

This report covers the July 2003 quarterly soil gas sampling event. The installation and initial sample of the soil gas monitoring wells occurred in February of 2002. Samples were collected at each 19 of the originally installed 27 soil gas monitoring wells and were analyzed for light hydrocarbon gases. Well numbers 20 through 27 were not sampled Analysis of other air components (CO_2, O_2, etc.) was discontinued because is showed no useful data. The analysis includes natural gas that would be found in the storage facility gas including methane, ethane, propane, iso and normal butane, iso and normal pentane, iso and normal hexane. Other natural gases analyzed include ethene, propene, oxygen, carbon dioxide, and carbon monoxide.

As per an agreement between Eldorado Hills and Public Service Company of Colorado (PSCC), the data collected from soil gas wells on the adjacent PSCC lease is included and with and discussed in this report.

It should be noted that this study only investigates the potential for leakage from the LGSF at the Spring Mesa Development, and it is beyond the study's scope to investigate leakage from the LGSF onto the LGSF lease property (outside of the reservoir) itself or onto other surrounding properties, except as such leakage would cause a potential hazard on the Spring Mesa property.

2. Sampling and Analysis Results

The locations of the soil gas monitoring wells are shown in Figure 2. The soil gas monitoring wells were sampled by purging at least three well casing volumes and then a sample was pumped into a Tedlar Gas Bag. A field duplicate was collected during the well sampling event as well as an ambient air sample. The samples were delivered to the ESN's Golden based laboratory on the same day they were collected. Details regarding the well construction, sampling and analytical methods can be found in the March 6, 2002 report.

During the previous quarter's sampling event (April 2003), water levels had risen and interfered with sampling in a number of the soil gas monitoring wells. This was the result of the record snowstorm that occurred when the sampling event was to occur, delaying that quarters sampling by a month. Wells that could not be sampled during that period included SM-6, SM-7, SM-8, SM-13. During the July sampling, ESN was able to recover soil gas from all of the wells except for SM-13, which still recovered water instead of soil gas. Also, SM-19 was damaged again (presumably from livestock activity) and could not be sampled during this event.

Sampling was conducted on July 10th, 2003. We continued sampling monitoring wells numbers 1-19 as originally planned. Well numbers 20-27, which were the temporary wells designed to test certain locations were we had surface gas readings, were not sampled since we have not seen any gases in these wells. A field duplicate sample and ambient air sample were also collected at SM-14.

The gas samples were analyzed by Flame Ionization (FID) Gas Chromatography for the natural gas hydrocarbons. The gas chromatographs are calibrated daily with certified gas standards and the appropriate quality control samples (blank checks, calibration checks, duplicates) are run each day. The detailed results of each sample for both the Spring Mesa and PSCC wells are included in the Appendix. The samples were analyzed for components listed and resulted in the range of concentrations listed in Table 1.

Table 1: Range of Gases Detected in July 2003 Monitoring Well Sampling Event at Spring Mesa

Natural Gas (Hydrocarbon) Components			
Methane	0.85 – 2.4 ppm	Iso-Butane	ND – 0.52 ppm
Ethane	ND	Normal-Butane	ND – 2.2 ppm
Ethene	ND	Iso-Pentane	ND – 2.8 ppm
Propane	ND	Normal-Pentane	ND – 1.4 ppm
Propene	ND	Iso-Hexane	ND – 0.67 ppm
(ND – Not Detected)		Normal-Hexane	ND – 0.10 ppm

Only ambient levels of methane were detected along with trace amounts of heavier gases. The Ambient air sample contained 2.1ppm of methane, and traces of heavier gases including butanes, pentanes and hexanes. The trace amount of heavier hydrocarbons appears to be contamination, possibly from common fuel vapors. The PSCC wells had similar readings within the above ranges. The report from that survey is included with this report for review.

The Leyden storage gas contains approximately 91% methane, 8% ethane, 1% propane and 0.1% butanes. If storage gas had been present in the samples, the ratios of the hydrocarbons would be similar to these percentages (after subtracting out atmospheric methane.) A leak from the gas storage facility would also generate concentrations at a much higher magnitude than seen in any of these samples.

3. Conclusions and Recommendations

There continues to be no evidence of storage gas leakage onto the Spring Mesa Property or in the adjacent monitoring locations at the Leyden Gas Storage Facility. ESN recommended continued quarterly monitoring of primary soil gas monitoring wells (SM-1 through SM-19) as requested by the City of Arvada for up to a year from the installation date of the wells, provided there are no changes in the continued withdrawal and depressurization of gas from the Leyden Facility.

Monitoring wells SM-20 through SM-27 were originally installed where minor indications of surface gas were detected in the reconnaissance survey. Since no storage gas was detected in previous sampling events, ESN recommends that these wells be plugged and abandoned since their locations will likely interfere with grading and development of the site.

PSCC currently is planning continued withdrawal of the remaining gas at the Leyden Facility and eventual displacement with water and conversion to a water storage facility.

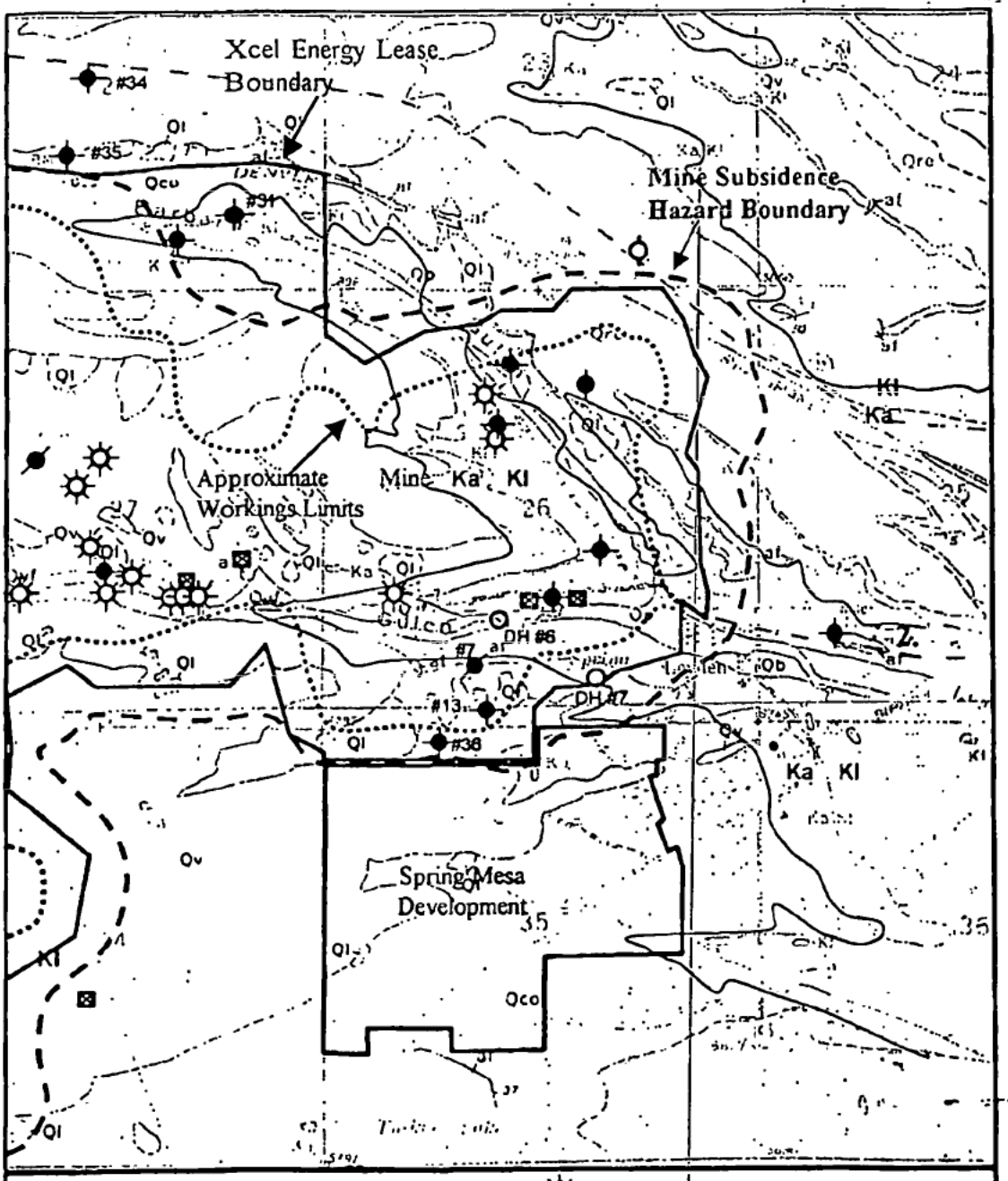

Figure 1. Spring Mesa Development Property and the Leyden Gas Storage Facility showing Jefferson County mine subsidence hazard boundaries, mine workings limits, mine shafts and well locations.

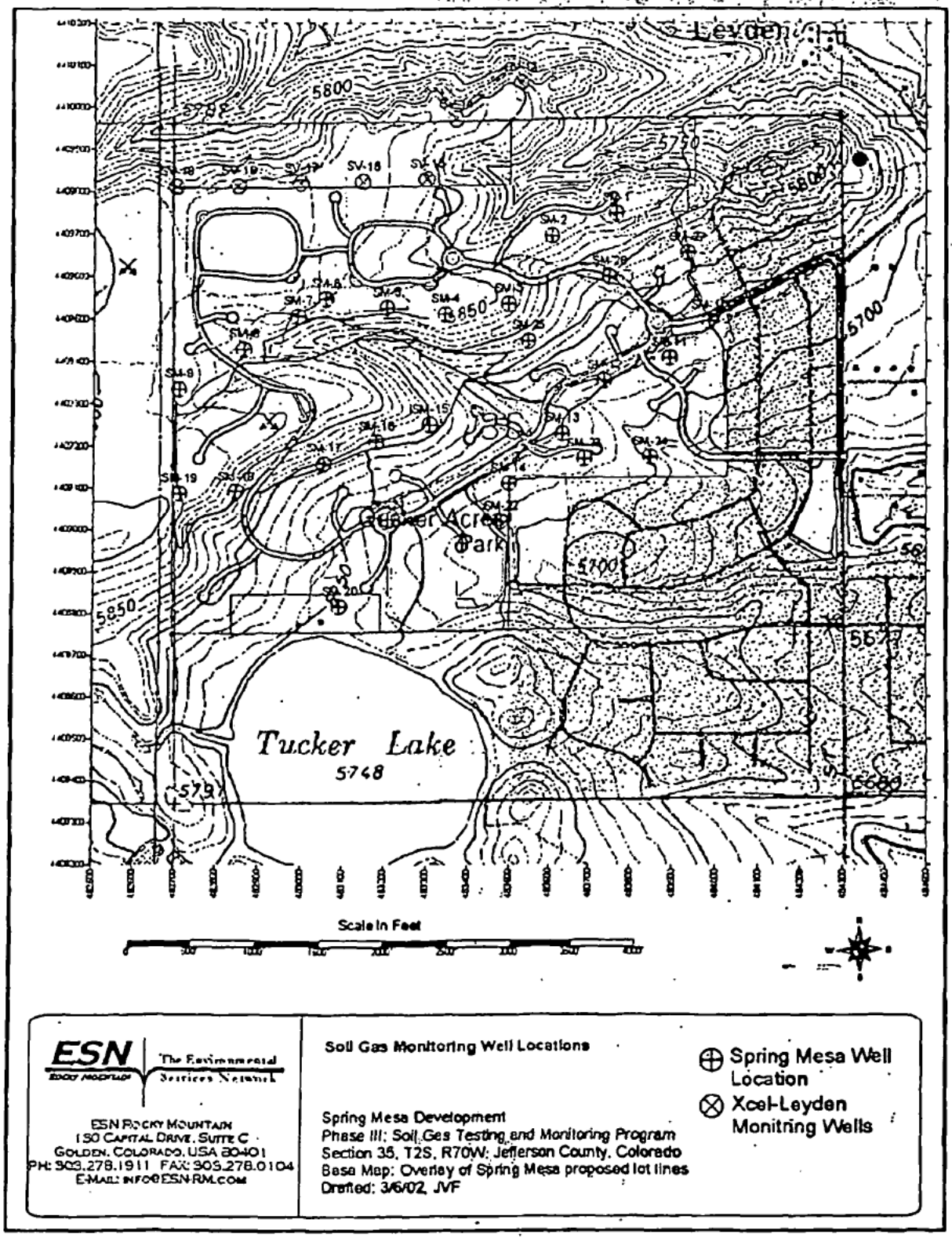

Figure 2. Map showing Spring Mesa and Leyden Facility Soil Gas Monitoring Wells.

4. References

1. 2002, Soil Gas Testing and Monitoring at the Spring Mesa Development, Jefferson County, 35-T2S-R70W, Progress Report for Phase III, prepared for Eldorado Hills, LLC., by John Fontana, ESN Rocky Mountain, March 6, 2002, ESN Project No. 1180.03.

Appendix 1

Laboratory Report

ESN Rocky Mountain
130 Capital Drive, Suite C
Golden, CO 80401

FINAL DATA

(303) 278-1911
FAX: (303) 278-0104
email: Lab@ESN-RM.com

CLIENT: Eldorado Hills
CLIENT PROJECT NO.:
ESN PROJECT NO.: 1180.09.101186
PROJECT NAME: Spring Mesa Soil Gas

C_1-C_6 Hydrocarbons by FID Gas Chromatography

GAS CONCENTRATIONS BY VOLUME
(Parts-per-Million by Volume)

Client ID	Sample Date	Receive Date	Analysis Date	Data Notes*	Methane	Ethane	Ethene	Propane	Propene	iButane	nButane	iPentane	nPentane	iHexane	nHexane
SM-1	7/10/03	7/10/03	7/11/03		1.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SM-2	7/10/03	7/10/03	7/11/03		1.98	0.00	0.00	0.00	0.00	0.00	0.06	0.11	0.00	0.00	0.00
SM-3	7/10/03	7/10/03	7/11/03		2.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SM-4	7/10/03	7/10/03	7/11/03		2.55	0.00	0.00	0.00	0.00	0.00	0.13	0.13	0.00	0.00	0.00
SM-5	7/10/03	7/10/03	7/11/03		1.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SM-6	7/10/03	7/10/03	7/11/03		2.42	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SM-7	7/10/03	7/10/03	7/11/03		1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SM-8	7/10/03	7/10/03	7/11/03		0.99	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SM-9	7/10/03	7/10/03	7/11/03		0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SM-10	7/10/03	7/10/03	7/11/03		2.36	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
SM-11	7/10/03	7/10/03	7/11/03		0.89	0.00	0.00	0.00	0.00	0.00	0.11	0.21	0.12	0.00	0.00
SM-12	7/10/03	7/10/03	7/11/03		0.95	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00
SM-13					No Sample - Water in Well										
SM-14	7/10/03	7/10/03	7/11/03		2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SM-14 FD	7/10/03	7/10/03	7/11/03	FD	2.13	0.00	0.00	0.00	0.00	0.52	2.20	2.81	1.35	0.67	0.10
SM-15	7/10/03	7/10/03	7/11/03		1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SM-16	7/10/03	7/10/03	7/11/03		1.14	0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.00	0.00	0.00
SM-17	7/10/03	7/10/03	7/11/03		1.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SM-18	7/10/03	7/10/03	7/11/03		0.78	0.00	0.00	0.00	0.00	0.00	0.09	0.15	0.00	0.00	0.00
SM-19					No Sample - Broken Wellhead										
SM-14 AMBIENT	7/10/03	7/10/03	7/11/03		2.05	0.00	0.00	0.00	0.00	0.00	0.19	0.30	0.16	0.08	0.00
DETECTION LIMITS:					0.10	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

C_1-C_6 Hydrocarbons by FID Gas Chromatography

Hydrocarbon Percent Composition by Volume (Mole %)

Client ID	Methane	Ethane	Ethene	Propane	Propene	iButane	nButane	iPentane	nPentane	iHexane	nHexane
SM-1	100.0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
SM-2	92.0%	0.00%	0.00%	0.00%	0.00%	0.00%	2.79%	5.25%	0.00%	0.00%	0.00%
SM-3	100.0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
SM-4	90.8%	0.00%	0.00%	0.00%	0.00%	0.00%	4.78%	4.45%	0.00%	0.00%	0.00%
SM-5	100.0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
SM-6	95.9%	0.00%	4.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
SM-7	100.0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
SM-8	83.2%	0.00%	16.84%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
SM-9	100.0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
SM-10	97.0%	0.00%	0.00%	0.00%	0.00%	0.00%	3.02%	0.00%	0.00%	0.00%	0.00%
SM-11	61.2%	0.00%	0.00%	0.00%	0.00%	0.00%	9.55%	18.52%	10.72%	0.00%	0.00%
SM-12	91.8%	0.00%	0.00%	0.00%	0.00%	0.00%	8.25%	0.00%	0.00%	0.00%	0.00%
SM-13											
SM-14	100.0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
SM-14 FD	21.8%	0.00%	0.00%	0.00%	0.00%	5.37%	22.51%	28.76%	13.79%	6.83%	0.98%
SM-15	100.0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
SM-16	83.3%	0.00%	0.00%	0.00%	0.00%	0.00%	8.39%	8.33%	0.00%	0.00%	0.00%
SM-17	100.0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
SM-18	76.1%	0.00%	0.00%	0.00%	0.00%	0.00%	8.95%	14.96%	0.00%	0.00%	0.00%
SM-19											
SM-14 AMBIENT	73.8%	0.00%	0.00%	0.00%	0.00%	0.00%	6.96%	10.64%	5.85%	2.70%	0.00%

*ABBREVIATIONS
TB = Trip Blank FD = Field Duplicate
MB = Method Blank LD = Laboratory Duplicate
TB = Trip Blank LS = Laboratory Spike

DATA FLAGS
j = as estimated concentration outside the calibration range of the method
b = analyte also appeared in the associated method blank for this sample

(b) (5) (DPP)

(b) (5) (DPP)

IN THE MATTER OF THE PROMULGATION AND ESTABLISHMENT OF FIELD RULES TO GOVERN OPERATIONS IN THE LEYDEN GAS STORAGE FACILITY, JEFFERSON COUNTY, COLORADO

Cause No. 146 Order No. 146-3

REPORT OF THE COMMISSION

This cause came on for hearing before the Commission at 10:00 a.m. on August 18, 2003 in the Petroleum Hall and at 8:00 a.m. on August 19, 2003 in the Metals Hall at the Green Center, Colorado School of Mines, 1500 Illinois Street, Golden, Colorado for an order authorizing the closure of the Leyden Underground Natural Gas Storage Facility.

SUMMARY OF PROCEEDINGS

The Commission finds as follows:

1. Public Service Company ("Public Service") as applicant herein, is an interested party in the subject matter of the above-referenced hearing.

2. Due notice of the time, place and purpose of the hearing has been given in all respects as required by law.

3. The Commission has jurisdiction over the subject matter embraced in said Notice, and of the parties interested therein, and jurisdiction to promulgate the hereinafter prescribed order.

4. On September 30, 1960, the Commission issued Order No. 146-1 which approved the project as proposed by Public Service for the storage of natural gas in an underground reservoir situated in the Laramie Formations in what is commonly known as the Leyden Coal Mine, Jefferson County, Colorado, situated in all or parts of Sections 21-22, 26-28, and 33-35 of Township 2 South, Range 70 West, 6th P.M. Public Service has operated the Leyden Underground Natural Gas Storage Facility (the "Facility") since 1960, injecting and withdrawing natural gas to support its natural gas distribution and delivery operations in the Front Range area of Colorado.

5. In the spring of 2000, Public Service announced its decision to close the Facility due to the increasing incompatibility of its continued gas storage operations with the encroaching residential and commercial development of the surrounding area. Public Service obtained authority from the Colorado Public Utilities Commission to abandon the Facility in January, 2001. Injection of natural gas into storage ended on September 30, 2001, and Public Service has been withdrawing natural gas from the Facility since that time.

6. In July 2001, the Colorado General Assembly amended the Oil and Gas Conservation Act to give exclusive authority to the Oil and Gas Conservation Commission to regulate the closure of underground natural gas storage caverns ("Closure Statute"). Prior to closure of the Facility, Public Service is required to obtain a certificate of closure from the Commission. To obtain a certificate of closure, Public Service must demonstrate that its closure plan reasonably protects public health, safety and welfare, including protection of the environment.

7. On March 3, 2003, Public Service filed an application with the Commission for an order authorizing the closure of the Facility. A Closure Plan, which provides for the closure of the Facility as a natural gas storage facility following the withdrawal of recoverable storage gas from the caverns and the

abandonment of certain wells and equipment, was filed with the application. Public Service has been withdrawing natural gas from the Facility si nce the last injection occurred in 2001. According to its Closure Plan, upon issuance of a certificate of closure by the Commission, Public Service will begin to inject potable water through existing wells to flood the underground cavern, displacing storage gas and facilitating the withdrawal process. Following closure, Public Service plans to turn over the site to the City of Arvada ("Arvada"), which will use the underground caverns for municipal water storage. The Closure Plan is submitted in accordance with the requirements of the Closure Statute to protect the public health, safety and welfare, including the environment, relating to the closure of the Facility. Section III of the Closure Plan provides for the recovery of residual natural gas reasonably recoverable from the underground caverns. Section IV of the Closure Plan provides for the transfer of certain wells and well sites to Arvada for i ts use in ongoing water storage operations, while Section V provides for the abandonment of all other wells and reclamation of all other well sites in compliance with the Commission's rules and regulations. Section VI of the Closure Plan provides for the abandonment of the mine shafts that were originally sealed during the early 1960's as part of the process to convert the abandoned coal mine to a natural gas storage facility. Sections VII and VIII prov ide for the abandonment of wells used as observation wells during natural gas storage operations, and the abandonment of natural gas gathering pipelines and related above-ground facilities. Finally, Sections IX and X of the Closure Plan provide for monitoring during and after closure of the Facility, including corrective actions if such monitoring indicates that the initial measures are insufficient.

8. On April 7, 2003, Union Pacific Railroad Company, ("UPRR") protested the application.

9. On April 8, 2003, El Dorado Estates Homeowners' Association ("El Dorado"), Mobelisk, L.L.C. ("Mobelisk") and Northwest Industrial Subdivision II, Inc. ("NWIS") (together, "El Dorado et al.") protested the application and filed a request for continuance to the July hearing.

10. On April 8, 2003, Jefferson County Department of Health and Environment ("JCDHE") filed a petition to intervene on the application.

11. On April 8, 2003, a prehearing conference was held to clarify the nature and scope of the hearing to be conducted on the application filed by Public Service.

12. On April 11, 2003, UPRR filed a request for continuance to the August hearing.

13. On April 14, 2003, a prehearing conference was held to clarify the nature and scope of the hearing to be conducted on the application filed by Public Service.

14. On April 21; 2003, site visits to the Facility and the initial hearing on the application were held. Public comments were made and procedural issues were decided. JCDHE withdrew its request to intervene on the application. The Commission continued the matter to the July hearing, appointed Commissioner Mueller as Hearing Officer to preside over and rule upon scope of hearing, discovery requests and hearing management issues.

15. On April 22, 2003, a prehearing conference was held to clarify the nature and scope of discovery to be conducted on Public Service's application.

16. On May 13, 2003, a prehearing conference was held to discuss discovery requests and to rule on objections to discovery requests on the application filed by Public Service and the issues raised by the protestants thereto.

17. On June 13, 2003, Public Service filed with the Commission a Motion to Dismiss UPRR's Protest. On June 16, 2003, UPRR filed with the Commission a Request for Briefing Schedule in Response to Public Service's Motion to Dismiss.

18. On June 18, 2003, El Dorado et al. filed with the Commission a Motion to Compel Applicant to Allow Protestants to Continue Copying.

19. On June 24, 2003, UPRR filed with the Commission a Motion to Strike Public Service's Motion to Dismiss.

20. On June 26, 2003, El Dorado et al. filed with the Commission a Motion to Strike Public Service's First Expert Disclosures and Witness List of Protestants El Dorado et al. On June 27, 2003, Public Service filed a Response to the Motion to Strike and a Supplemental Motion to Strike.

21. On June 30, 2003, a prehearing conference was held to discuss issues related to discovery and several motions from the parties on the application filed by Public Service and the issues raised by the protestants thereto.

22. On July 2, 2003, El Dorado et al. filed with the Commission a Motion to Conduct Hearing at Arvada City Council Chambers.

23. On July 11, 2003, El Dorado et al. filed with the Commission a Request for the Commission to Consult with Other State Agencies and Independent Experts.

24. On July 11, 2003, El Dorado et al. filed with the Commission a Motion to Dismiss Public Service's application.

25. On July 11, 2003, a Notice of El Dorado et al.'s Withdrawal from the Evidentiary Stage of the Hearing and Notice of Withdrawal of Welborn Sullivan Meck & Tooley, P.C. as Counsel of Record.

26. On July 14, 2003, Public Service filed with the Commission a Response to Motion to Withdraw Filed By El Dorado et al.

27. On July 15, 2003, a prehearing conference was held to discuss several motions from the parties on the application filed by Public Service.

28. On August 13, 2003, a prehearing conference was held to discuss witnesses, subject matter, timing, Rule 510. statements, and management of the hearing.

BASIS OF FINDINGS

APPLICANT'S EVIDENCE

29. The Commission heard expert testimony and reviewed exhibits from Bill Uding, Gas Storage Projects Director, Xcel Energy Services Inc. regarding the history of the Facility, the proposed closure plan and monitoring program, lost and unaccounted for natural gas, and Arvada's plans for water storage. Mr. Uding testified that natural gas has been stored in the caverns at approximately 700 to 1100 feet, the caverns will be injected with water until flooded and the natural gas displaced, shafts and gathering systems will be abandoned, wellheads and surface facilities will be cleaned up and the surface restored, and post closure monitoring will occur for twenty-four (24) months after the #9 Well is filled

with water. In addition, he testified that approximately three percent (3%) of the total volume of natural gas injected into the Facility has been recognized on Public Service's accounting books a s lost or unaccounted for, due in part to natural gas used at the Facility and to inaccurate metering. Mr. Uding opined that twenty-one percent (21%) of this natural gas was used at the Facility to fuel 17,000 horsepower of compressors used in gas storage operations and for other uses, with the remainder miscalculated due to meter inaccuracies, and that less than two hundred thousand (200,000) MCF of natural gas will remain in the Facility due to the une conomic withdrawal or recovery of this natural gas. He further testified that some of this gas will be subsequently withdrawn when Arvada commences water withdrawal and re-injection activities, and that Arvada has prepared for the additional gas recovery. Mr. Uding further opined that the caverns are currently one third (1/3) filled with water, and that the proposed Closure Plan will adequately protect public health, safety, welfare and the environment.

30. The Commission heard testimony and reviewed an exhibit from Benjamin Fowke, Vice President/Treasurer, Public Service who opined that Public Service's financial position is sufficient to guarantee performance and the ability to fulfill any obligation imposed under □34-60-106(17), C.R.S., including but not limited to, post closure corrective action. Mr. Fowke testified that the closure of the Facility is estimated to cost between six million do llars ($6,000,000) and nine million dollars ($9,000,000), however Public Service's guarantee is not limited to a dollar amount.

31. The Commission heard expert testimony and reviewed expert reports and exhibits from Dr. Robert Weimer, Consulting Geologist regarding the structural and stratigraphic geology of the Facility in relation to storage and closure, including sandstone reservoirs, natural gas migration and seals. Dr. Weimer testified that in the Lower Laramie Sandstone the crevass splay channel sandstones are three (3) to five (5) acres in size, the point bar sands tones in meander belts north of the mined area are ten (10) to twenty (20) acres, and the size of the reservoir compartments would limit lateral migration of natural gas to a few hundreds of feet. According to Dr. Weimer, sandstones above and below the mine rubble zone are not continuous and sheet-like, but occur as lenticular and isolated lenses, encased by impermeable claystones that form seals to prevent gas migration. In addition, he testified that no faulting was recorded on the detailed mine maps over the approximate two (2) square miles of the Facility, nor have faults been identified on the west side of the Facility. Dr. Weimer opined that the absence of faulting and associated fracturing, and the excellent caprock seal of the Upper Laramie Formation, consisting mostly of claystones and siltstones, has prevented natural gas migration to the surface, and based on the reservoir sizes any vertical migration would be confined to the mine collapse rubble. He testified that natural gas leakage to the surface at the Facility has been related to breaking the sealing beds by drilling wells, each of which were remediated by restoring a seal in the wellbore, and that the proposed Closure Plan would protect public health, safety, welfare and the environment.

32. The Commission heard expert testimony and reviewed expert reports and exhibits from Dave Cox, Senior Consultant, Questa Engineering Corp. regarding the potential for natural gas leakage out of the Facility, methods to abandon wells, amount of natural gas remaining in the Facility at closure and the proposed use of the Facility for water storage. Mr. Cox testified that there have been six (6) significant occurrences of identified natural gas m igration out of the immediate area of the mine workings, as a result of mining or natural gas storage activities. In addition, he testified that there have been four (4) insignificant natural gas shows on mud logs or neutron-density logs from wells outside the mined area, unrelated to storage natural gas or so minor they did not warrant further investigation. Mr. Cox further testified that there have been no indications of significant migration into the Fox Hills Aquifer and no incidents of storage natural gas above the Lower Laramie Formation. He testified that any potential for natural gas leakage after closure will be greatly reduced by most of the wells being plugged with cement from top to bottom, most of the natural gas being removed by depletion and then displacement by water injection, and any remaining natural gas being left as small isolated pockets at depth below the

Upper/Middle Laramie sea l. Mr. Cox opined that approximately 0.197 BCF of natural gas (0.020 BCF attic natural gas, plus 0.032 BCF inaccessible trapped natural gas pockets, plus 0.055 BCF possibly trapped in sandstone lenses, plus 0.090 BCF adsorbed natural gas) is estimated to remain in the Facility at closure, with almost half of the natural gas in an adsorbed and unmobile state. These figures were confirmed by material balance calculations, which is a separate, independent engineering calculation. He further testified that future use of the Facility for water storage will provide water to fill up the caverns more rapidly than natural water influx, displacing a significant volume of natural gas and reducing the potential for any future natural gas migration. Mr. Cox opined that the proposed Closure Plan would protect public health, safety, welfare and the environment.

33. The Commission heard expert testimony and reviewed expert reports and exhibits from Greg Sherman, Geologist and President of Western Environmental and Ecology, Inc. regarding subsidence in the context of closure at the Facility. Mr. Sherman testified that the depth to the top of the mined interval ranges from approximately 684 feet to 1104 feet, and the width of the working is approximately 200 feet, with an average mined seam thickness repor ted at 7.5 feet. In addition, he testified that the fracture/rubble zone associated with collapse of the mine occurs between 24 feet and 61 feet above the workings, and no surficial evidence of significant mine subsidence was observed or has been reported. Mr. Sherman opined that the maximum subsidence-related surface strain that could have occurred above the Leyden Mine is 0.27%, and the maximum surface subsidence is 0.81 feet. He further testified th at 95% of subsidence occurs within two (2) years of initial mining, and that the maximum amount of subsidence that could affect the railroad is .018 feet. Mr. Sherman concluded that additional subsidence will likely not occur as a result of the closure of the Facility or with the proposed use by Arvada. He stated that the subsidence that could occur, as a result of or concurrent with the closure of the Facility, would be orders of magnitude less than th e maximum worst case predicted to occur at the time of mining, and as a result, no damage could occur to infrastructure on or adjacent to the Facility. Mr. Sherman opined that the proposed Closure Plan will adequately protect public health, safety, welfare and the environment.

34. The Commission heard expert testimony and reviewed expert reports and exhibits from Tom Hesemann, Hydrogeologist and Engineering Geologist, Tetra Tech RMC regarding the adequacy of the proposed Closure Plan with respect to hydrogeology. Mr. Hesemann testified on the geologic materials and structural geology in the area of the Facility, movement and occurrence of ground water, and water quality. He opined that in addition to the effective sea l formed by the Upper Laramie Formation, the water level (pressure) in the Laramie-Fox Hills Aquifer is above the natural gas pressure level in the caverns, demonstrating there is no hydraulic potential for natural gas to migrate into the aquifer. Mr. Hesemann concluded that absent manmade pathways, storage gas or stored water will not migrate to the surface or to the surficial aquifer. He testified that any residual natural gas remaining in the caverns and the surrounding formations will be properly monitored and managed. Mr. Hesemann opined that the well plugging program will maintain the integrity of the natural condition of the Laramie-Fox Hills Aquifer, and that the proposed Closure Plan will adequately protect public health, safety, welfare and the environment.

35. The Commission heard expert testimony and reviewed expert reports and exhibits from David Folkes, Engineer and President, EnviroGroup Limited regarding the potential for storage gas to be present in shallow soils after the closure of the Facility. Mr. Folkes testified about the requirements necessary for natural gas to migrate from the subsurface into buildings which include a source of natural gas, a driving mechanism to cause natural gas to move and a pathway for natural gas to move along. In addition, he testified that there is no evidence of storage gas in shallow soils nor is it likely to exist once the Facility is closed. In Mr. Folkes' opinion, previous conclusions that data recorded from the 1992 GR-5 seismic line showed faulting and associated soil gas anomalies indicated leaking gas were in error. He opined that the potential for storage gas leaks along well casings and abandoned borings, which were

occasionally observed in shallow soils in small areas on the Facility property, will be significantly reduced due to the removal of driving pressure heads, the much smaller aerial extent of any remaining natural gas, and the lack of replenishment and ultimate depletion of any residual pockets of natural gas that could leak to the surface. Mr. Folkes testified that the potential for storage gas in shallow soils at the Facility after c losure is even further reduced by the lack of gas pressure and small volumes of residual gas. He recommended that Public Service install additional soil gas monitoring wells along the GR-5 seismic line in Section 26 and at other locations above the areas of mining era borings identified on Exhibit E-1. Mr. Folkes further opined that the proposed Closure Plan will adequately protect public health, safety, welfare and the environment.

36. The Commission heard testimony from Mark Floyd, Engineer, City of Arvada regarding the post-closure use of Facility. Mr. Floyd testified that the City wants to ensure the protection of the public health, safety and welfare of the citizens of Arvada and believes the storage of water in the Facility will attain this goal. In addition, he testified that the City plans to perform maintenance at the Facility beginning in November, with three (3) contractors working on plans for water injection by gravity flow into the caverns within the next several months. Mr. Floyd testified that Arvada owns or will own most of the surface over the Facility.

37. Based on recommendations from the expert witnesses and questions from the Commission, Public Service proposed three (3) additional provisions to be included in the proposed Closure Plan to address soil natural gas testing at surface exploration drill holes, blowout prevention equipment for water wells and the use of Well #34 as an observation well during the two (2) year post-closure phase. In addition, Public Service agreed with Mr. Folkes's recommendation to install additional soil gas monitoring wells along the GR-5 line in Section 26 and at other locations above the areas of mining era borings identified on Exhibit E-1.

COGCC/DMG/DWR STAFF ANALYSIS

38. The Commission heard staff analysis from Morris Bell, COGCC Operations Manager, who has reviewed the expert reports and heard the testimony from the expert witnesses. Mr. Bell agrees with two (2) of the three (3) additional proposed plan provisions but would prefer to have COGCC staff notified by the State Engineer's Office when water well permits are proposed on or near the Facility. After discussion on his proposed language for this change , Public Service agreed with COGCC staff's proposal. Mr. Bell recommended that the Commission adopt the proposed Closure Plan with the additional provisions, indicating he agreed with the proposed plugging procedures and believes the proposed Closure Plan will protect public health, safety, welfare and the environment.

39. The Commission heard staff analysis from Al Amundson, Mining Engineer with the Division of Minerals and Geology who has reviewed the expert reports and provided a written report, and heard the testimony from the expert witnesses. Mr. Amundson concluded that most if not all subsidence has occurred over the mine, the only instances of natural gas migration from the Facility have been along constructed openings into the mine, drill holes and sha fts, and any natural gas migration off the property or to the surface in the future will likely only be along fractures induced by subsidence or produced in water withdrawn from the mine. He recommended that water be placed in the caverns by gravity flow at atmospheric pressure. In addition, he believes the proposed Closure Plan will protect public health, safety, welfare and the environment.

40. The Commission heard staff analysis from Kevin Rein, Water Engineer with the Division of Water Resources, State Engineer's Office who provided a written report, described the manner in which water wells are permitted by his office, and the agreement currently in place to notify Public Service of any proposed water well over or within a one-half (1/2) mile of the Facility.

PUBLIC COMMENT/PARTICIPATION

41. Pursuant to Rule 510., five (5) citizens made statements at the April hearing regarding concerns about natural gas migration, subsidence, migration of underground water, boundaries of the mined area, disclosure of data, lost and unaccounted for storage gas, safety and value of nearby homes, and related lawsuits.

42. Pursuant to Rule 510., five (5) citizens made statements at the August hearing regarding concerns about the technical interpretation of the geology and engineering data at the Facility, monitoring wells, lost and unaccounted for storage gas, natural gas migration, remediation and payment for potential damages, water well drilling, plugging of wells, partnering between Public Service and the Colorado School of Mines for more science-based studi es, and the abuse of the Rule 510. statement process.

43. In response to Commission questions to one of the Rule 510. statement makers, Public Service indicated its plan to provide the COGCC staff with quarterly monitoring data that will be posted to the COGCC website and will be documented as the fourth additional plan provision.

FINDINGS

44. After deliberation, the Commission suggested that Public Service consider installing additional soil gas monitoring wells in an effort to provide nearby homeowners with more data. Public Service consented to the installation of twenty (20) new soil gas monitoring wells, to be evenly spaced along the perimeter of the Facility, where it can obtain surface access, not located near the landfill or Superfund site, and with the wells to remain in p lace for two (2) years post-closure. In addition, Public Service proposed that approval of the location of the additional soil gas monitoring wells by COGCC staff be obtained within ninety (90) days of the date of the hearing and agreed to let Mr. Greg Murray participate in the discussion with COGCC staff.

45. Based on the facts stated in the verified application, review of the closure plan, field tours of the Facility and the surrounding area, the presentation of compelling evidence, including credible expert testimony and exhibits, the financial assurances of Public Service, DNR staff analysis, and public comments presented at the April and August hearings, the Commission finds that the Closure Plan as amended and modified herein, adequately prote cts public health, safety, welfare and the environment. As such, the Commission should issue a certificate of closure and enter an order to approve the proposed Closure Plan for the Leyden Underground Natural Gas Storage Facility with the four (4) additional plan provisions and the twenty (20) additional soil gas monitoring wells.

ORDER AND CERTIFICATE

NOW, THEREFORE IT IS ORDERED, that the Closure Plan for the Leyden Natural Gas Storage Facility as amended and modified herein, attached as Exhibit A and incorporated herein, is hereby approved.

IT IS FURTHER ORDERED, that Public Service is hereby issued a certificate of closure in accordance with □34-60-106(17)(b), authorizing Public Service to terminate operations and permanently close the Leyden Underground Natural Gas Storage Facility in accordance with the Closure Plan and this Order.

IT IS FURTHER ORDERED, that the provisions contained in the above order shall become effective forthwith.

IT IS FURTHER ORDERED, that the Commission expressly reserves its right, after notice and hearing, to alter, amend or repeal any and/or all of the above orders.

ENTERED this day of September 2003, as of August 19, 2003.

OIL AND GAS CONSERVATION COMMISSION OF THE STATE OF COLORADO

By Patricia C. Beaver, Secretary

Dated at Suite 801 1120 Lincoln Street Denver, Colorado 80203 September 17, 2003 ??

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(146#3)

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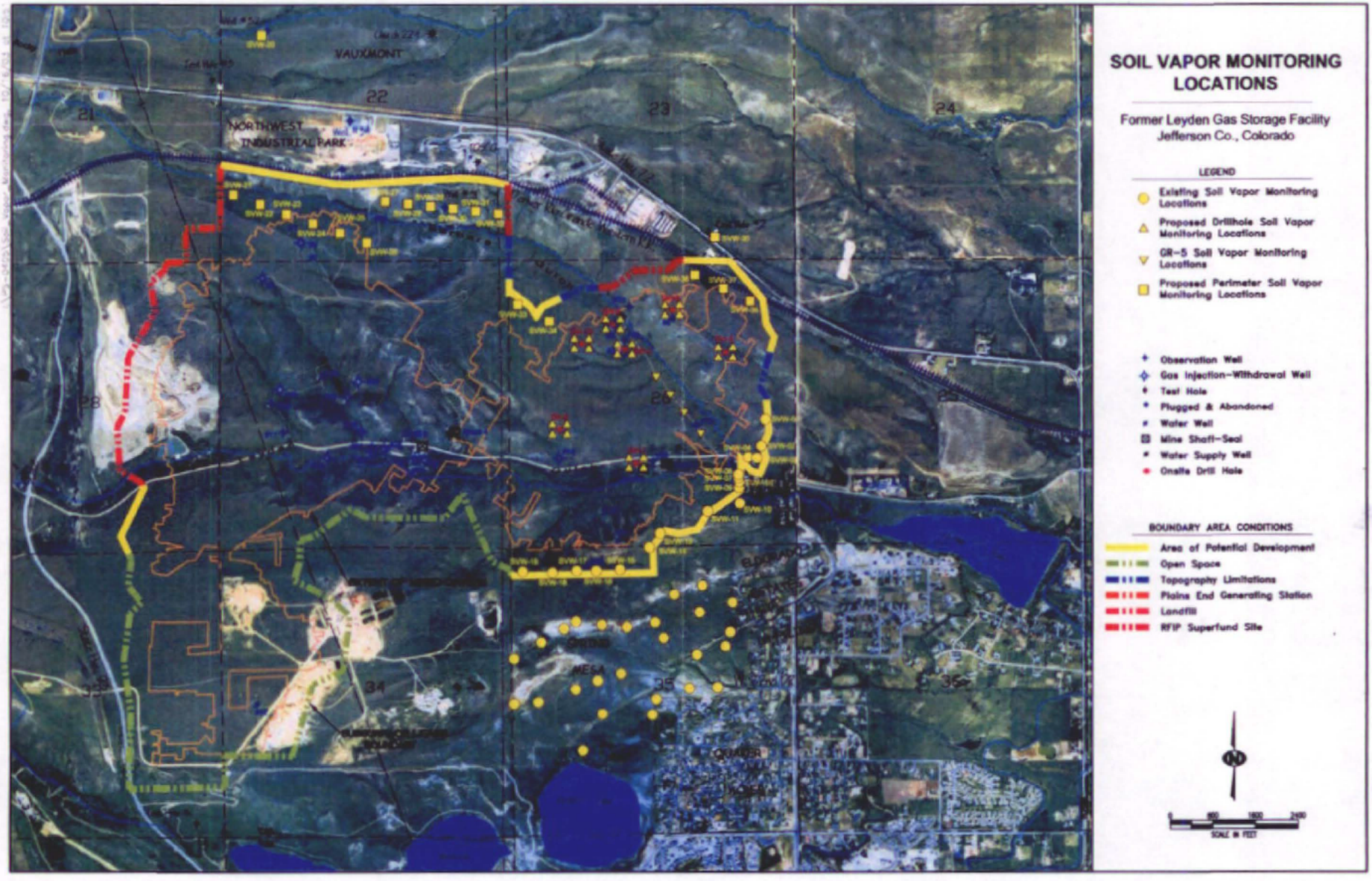
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Onsite Drill Hole
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Area of Potential Development
Open Space
Topography Limitations
Plains End Generating Station
Landfill
RFP Superfund Site
N
SCALE IN FEET

Xcel Energy℠
PUBLIC SERVICE COMPANY

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COGCC

Siting and Land Rights
550 15th Street, Suite 700
Denver, Colorado 80202-4256
Telephone: 303.571.7799
Facsimile: 303.571.7877

October 15, 2003

Colorado Oil and Gas Conservation Commission Staff
Suite 801
1120 Lincoln St
Denver, CO 80203

Quarterly Report of Closure Activities and Monitoring of the Leyden Gas Storage Facility.

Dear OGCC Staff:

Included with this letter are the data items identified in Closure Plan for Leyden, Section XI. These items include an updated Pressure-Volume Plot in the same format that was used at the public hearing, the soil gas monitoring data that has been collected from February 2000 to present at Leyden and data from a similar program in the adjacent Spring Mesa Development. A form 6 report of the #13 well abandonment is included. Also included in electronic format is an Excel Spreadsheet with the monitoring data from Leyden observation wells. These wells measure the static water level both in the storage caverns and in formations above and below the storage level.

Since the end of the hearing that began on August 19th of this year, progress has been made toward the closure of the Leyden Gas Storage Facility. One observation well, #13, has been plugged and abandoned, and well #12 has been worked over to ready it for use as a water injection well. It is anticipated that water injection may begin by the end of this month.

A review of field locations for new soil gas monitoring stations was conducted and agreed upon by Xcel Energy, OGCC staff, and an interested member of the public. These new soil gas monitor stations are expected to be installed and have testing begin within the next few weeks.

If you would like to discuss any of this information, please don't hesitate to contact me at 303 571-7383.

Sincerely,

Bill Uding

Xcel Energy
PUBLIC SERVICE COMPANY

Siting and Land Rights
550 15th Street, Suite 700
Denver, Colorado 80202-4256
Telephone: 303.571.7799
Facsimile: 303.571.7877

January 19, 2004

Colorado Oil and Gas Conservation Commission Staff
Suite 801
1120 Lincoln St
Denver, CO 80203

Quarterly Report of Closure Activities and Monitoring of the Leyden Gas Storage Facility.

Dear OGCC Staff:

This is second quarterly report of activities and accomplishments in the effort to close the Leyden Gas Storage Facility and covers the period from October 1, 2003 to December 31, 2003.

During this period, the City of Arvada started the process of filling the storage caverns with treated water. Injection began on November 18th, continued through the end of the year and was on going at the time of this report. By year end just over 300 acre feet of the required 2100 acre feet had been injected into the #12 well located in the west cavern.

All sites for additional soil gas monitor stations have been identified, approved by the various landowners, permitted as required, and cleared for underground obstructions. Installation and initial testing will begin during the current quarter. This new group of testing stations will include 6 to 9 additional sites along the Quaker St. right of way.

Reports for two rounds of testing of the existing soil gas monitor points conducted July and October of 2003 are included with this report. The reports from the testing on the Spring Mesa property during the same periods are also attached.

An update plot of Leyden Pressure vs. Volume is presented in its previous format. The new data shows a noticeable increase of pressure that coincides with the onset of water injected. This is an expected result. Two new plots are presented with this report. One plot, Leyden Water Injection History, showing the progress of the water injection volume graphically with time. The other is two trace plot showing Field pressures measured at gas well #9 vs. time and the Volume of Gas in Storage vs. time.

A diskette containing the pdf files of these plots is also included
If you would like to discuss any of this information, please don't hesitate to contact me at 303 571-7383.

Sincerely,

Bill Uding

Bill Uding

Xcel Energy®

550 15th Street, Suite 500
Denver, Colorado 80202

April 26, 2004

Colorado Oil and Gas Conservation Commission Staff
Suite 801
1120 Lincoln St
Denver, CO 80203

Quarterly Report of Closure Activities and Monitoring of the Leyden Gas Storage Facility.

Dear OGCC Staff:

This is the third quarterly report of activities and accomplishments in the effort to close the Leyden Gas Storage Facility and covers the period from December 31, 2003 to March 31,2004.

During this period, the City of Arvada continued the process of filling the storage caverns with treated water. As of March 31st a total of 769 acre feet of the required 2100 acre feet had been injected into the #12 well located in the west cavern.

All sites for additional soil gas monitor stations have been installed and initial testing has been done. A map showing the location of all soil gas sampling points is enclosed. Results of the current round of soil gas monitoring data including sample point locations is included.

Updated plots of Leyden Pressure vs. Volume, Leyden Water Injection History and the two trace plots showing Field Pressures measured at gas well #9 vs. Time and the Volume of Gas in Storage vs. Time are presented in their previous format. These plots are also included in pdf files on the enclosed diskette.

Work started on plugging the observation wells. As of March 31,2004, 10 wells had been plugged and abandoned, those being well # 2, 17a, 17b, 20, 23, 24, 27, 28, 29 and 32.

Beginning next quarter gas from Well #36 will be metered and vented.

If you would like to discuss any of this information, please don't hesitate to contact me at 303 571-7383.

Sincerely,

Bill Uding

Xcel Energy®

550 15th Street, Suite 500
Denver, Colorado 80202

July 15, 2004

Colorado Oil and Gas Conservation Commission Staff
Suite 801
1120 Lincoln St
Denver, CO 80203

Quarterly Report of Closure Activities and Monitoring of the Leyden Gas Storage Facility.

Dear OGCC Staff:

This is the fourth quarterly report of activities and accomplishments in the effort to close the Leyden Gas Storage Facility and covers the period from March 31, 2003 to June 30,2004.

During April and May, the City of Arvada continued the process of filling the storage caverns with treated water. As of May 31st a total of 1,114 acre feet of the required 2100 acre feet had been injected into the #12 well located in the west cavern. There was no water injection during the month of June.

Reports of all soil gas measurements are included. No new soil gas sampling locations have been added in the last quarter.

Field pressure was being measured at Well #9 until that well was plugged on March 29, 2004. Now the field pressure is being measured at Well #5. Updated plots of Leyden Pressure vs. Volume, Leyden Water Injection History and the two trace plots showing Field Pressures vs. Time and the Volume of Gas in Storage vs. Time are presented in their previous format. These plots are also included in pdf files on the enclosed diskette.

Venting of gas from Well #36 began April 1st. As of June 30th a total of 111 MCF had has been vented from this well.

Work continued on plugging wells. As of June 30th, 25 wells, and all four shafts had been plugged. The only remaining wells are #5, 7, 10, 11, 12, 18, 21, 31, 33, 34, 35, 36.

Storage gas was found in a Consolidated Mutual Water well in sec. 23,T2S, R70W, as previously reported to the commission. Monitoring of that well continues.

If you would like to discuss any of this information, please don't hesitate to contact me at 303 571-7383.

Sincerely,

Bill Uding
Project Director, HP Gas Engineering

Xcel Energy

550 15th Street, Suite 900
Denver, Colorado 80202

October 15, 2004

Colorado Oil and Gas Conservation Commission Staff
Suite 801
1120 Lincoln St
Denver, CO 80203

Quarterly Report of Closure Activities and Monitoring of the Leyden Gas Storage Facility.

Dear OGCC Staff:

This is the fifth quarterly report of activities and accomplishments in the effort to close the Leyden Gas Storage Facility and covers the period from June 30, 2004 to September 31, 2004.

During July and August, the City of Arvada did not inject any water into the cavern. Starting on September 1st water was injected into both the #12 well and the #7 well. Cumulative injection into well #12 in the west cavern is 1,218 acre feet and cumulative injection into well #7 in the east cavern is 44 acre feet for a total of 1,262 acre feet of the required 2100 acre feet.

Reports of all soil gas measurements are included. No new soil gas sampling locations have been added in the last quarter. Included on the enclosed disk is a copy of the database containing all of the soil gas sampling data.

Field pressure is now being measured monthly at well #5. To obtain a pressure the well is shut in for two days at the end of each month and the maximum buildup pressure is used. Updated plots of Leyden Pressure vs. Volume, Leyden Water Injection History and the two trace plots showing Field Pressures vs. Time and the Volume of Gas in Storage vs. Time are presented in their previous format. These plots are also included in pdf files on the enclosed disk.

Venting of gas from Well #36 continues. As of September 30th a total of 152 MCF had been vented from this well. Beginning in October the gas from Well #5 will also be vented as the flow is not sufficient to keep the station flare operational.

The only remaining wells are #5, 7, 10, 11, 12, 18, 21, 31, 33, 34, 35, 36. the plugging of the other wells has been completed.

The Consolidated Mutual Water well in sec. 23,T2S, R70W, continues to be monitored. A water pump will be installed in October and any natural gas that is produced will be metered.

If you would like to discuss any of this information, please don't hesitate to contact me at 303 571-7383.

Sincerely,

Bill Uding
Project Director, HP Gas Engineering

ESN Rocky Mountain | ENVIRONMENTAL SERVICES NETWORK

January 5, 2005

Liz Niemtschik
Xcel Energy
550 - 15th Street
Suite 700
Denver, CO 80202

Re: November 2004 Quarterly Soil Gas Sampling Event at Leyden
ESN Project No. 0126.20

Dear Liz:

Enclosed is the laboratory report for the November 2004 quarterly (4th quarter) sampling event at Leyden. A copy of the report from the Eldorado Hills Spring Mesa quarterly monitoring will be sent under separate cover, as per your agreement with Eldorado. A copy of the reports have also been sent to the City of Arvada.

Sampling was conducted between November 9th and December 6th. It took several visits to the field due to the difficultly in accessing some areas that had become snow covered and muddy. The Xcel field office management had requested we not accessed dirt roads and off road areas when conditions were soft to avoid damage to the property, and it would have been hazardous to access some areas.

Damage was found on a few of the soil gas monitoring wells, possibly from livestock attempting to chew on some of the well heads. Most of the damage was minor and simply required replacing some of the tubing and plastic valves on the top of the wells and was done in the field. Two of the wells (SVW-3 and SVW-36) could not be located and may be broken off below ground surface. SVW-8 could not be sampled due to damage to this well. Soil gas samples were collected from all the other wells.

A data sheet with the sorted sample analysis is attached. The analysis of the soil gas wells shows only ambient levels or less of methane and non-detect to trace levels of other components. Methane in the samples ranged from 0.1ppm to 3.2ppm with the exception of two samples discussed below. All of the samples contained methane concentrations near or less than the typical ambient air sample collected during in the past (2 to 4 ppm). The five ambient air samples collected during this sampling event contained 2.6 to 3.2 ppm methane. No samples were collected that had compositions similar to storage gas.

The two samples that had greater than ambient levels of methane included SVW-15 and SVW-51:

- SVW-15 had 66 ppm of methane and 0.04 ppm of ethane. Based on the composition of methane (99.9%) and ethane (0.05%), this is not storage gas but biogenic gas which has shown up in this well possibly due to the water that has been present in this well on several sampling events.

130 Capital Drive, Suite C
Golden, Colorado 80401-5654
Web Site: www.ESN-RM.com

ESN Rocky Mountain

PH: 303.278.1911
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E-Mail: ESN@ESN-RM.com

- SVW-51 contained 6.3 ppm of methane (only 3 ppm above ambient levels) and 0.04 ppm of ethane. The composition of this gas (98.6% methane and 0.7% ethane) is also reflective of biogenic gas and not storage gas, and is at near ambient levels.

With the exception of the two wells that have biogenic gas shows, there has been no increase in methane above ambient levels and no samples have the composition of storage gas. There is still no near surface evidence of storage gas leakage at the Leyden soil gas monitoring wells.

We will be contacting you regarding the repair of the damaged wells so that this can be completed before the next sampling event.

If you have any questions regarding this report or the data included, please feel free to give me a call.

Sincerely,

John V. Fontana
Vice President

RECEIVED
OGCC

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ESN Rocky Mountain

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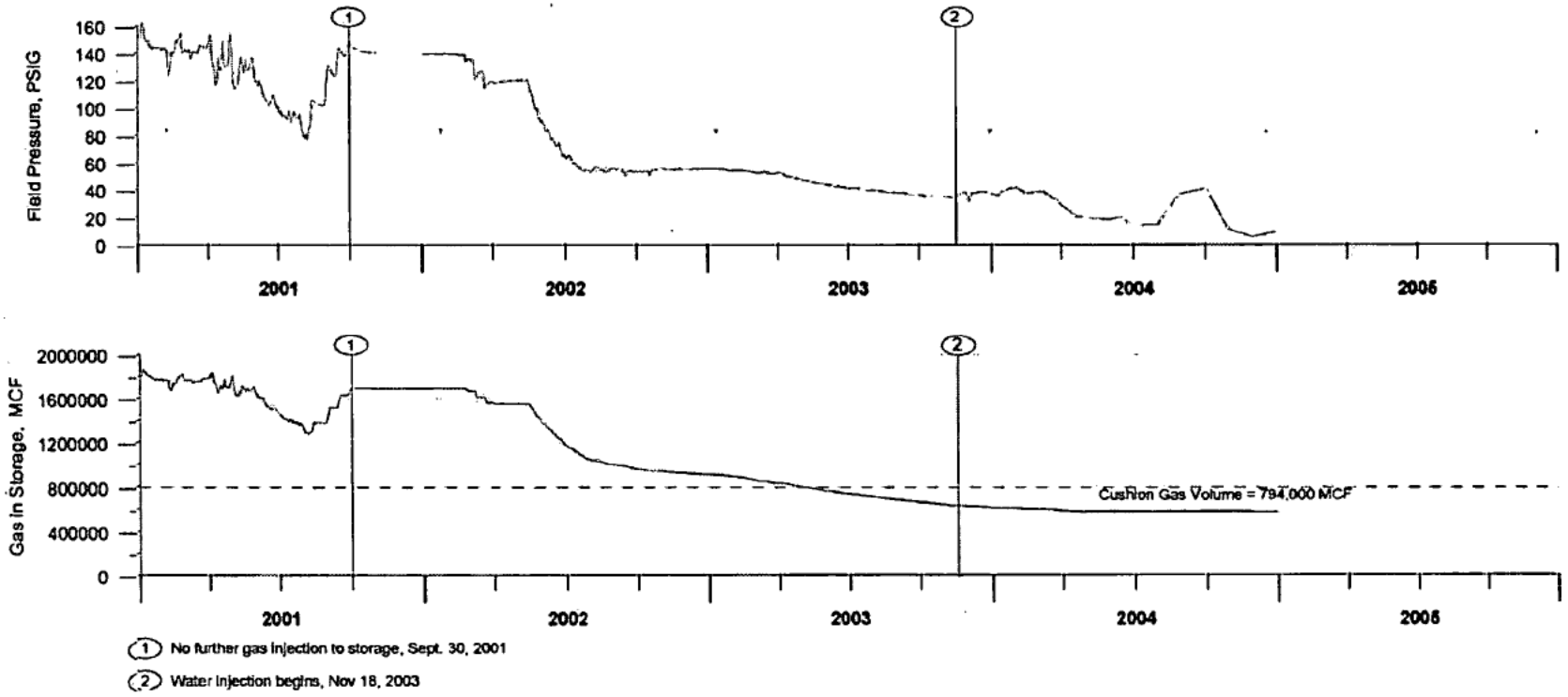
E-Mail: ESN@ESN-RM.com

1463
+ Leyden

Leyden Closure Progress
Field Pressure and Gas Volume History



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